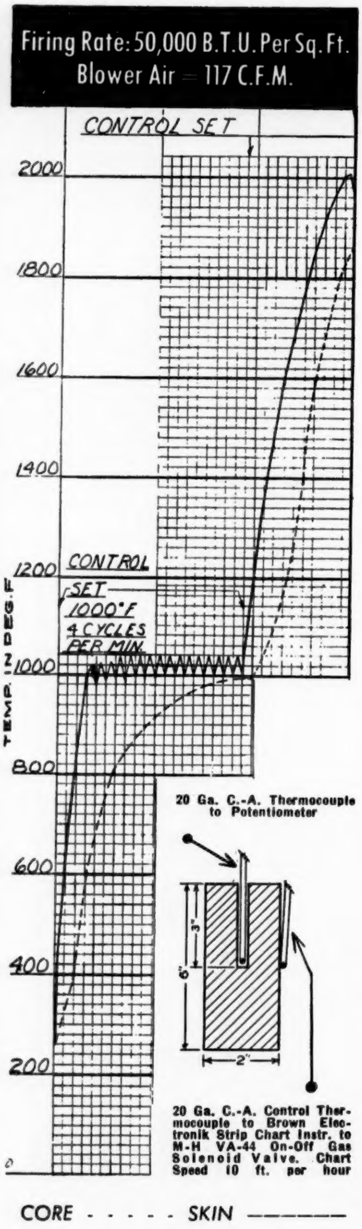
Metals Review

March 1958

Allen Gray
Editor, Metal Progress
(See Article, p. 4)

INSTANTANEOUS HEAT with
Holden Combustion System



INSPECT THIS PROVEN OPERATION AT OUR DETROIT PLANT

TEST DATA

1. A 20 gage thermocouple was welded to the outside of the 2" diameter x 6" long piece. A hole was drilled to accommodate a 20 gage thermocouple to record the inner temperature and the time differential.

2. The heating condition with the Luminous Wall face firing rate at 50,000 BTU's per sq. ft. in the following temperature ranges:
   - A. Up to 1000° F. (10 minutes lag 800° to 1000° F.)
   - B. Up to 1975° F. (3 minute lag)
   - C. 1975° to 2275° F. (3 minute lag)

OTHER NEW HOLDEN DEVELOPMENTS

Automatic Conveying System

1. A new automatic conveying system—Open for Inspection at Our Plant—that can be used for Salt Bath or Automatic Plating.

2. This conveying system can be used on In-Line Production or Return with a 30% savings on capital investment.

Aluminum Coating of Steel or Alloys

1. Furnace unit preheats metal.
2. New Holden flux over aluminum.
3. New method of bonding after aluminum coating.
4. Improves many alloys 3 to 1 in service life.
5. We can process pilot plant production.

YOUR INVITATION TO INSPECT—THREE NEW HOLDEN DEVELOPMENTS

1. New Method of Instantaneous Combustion.
2. New Conveyor System for Salt Baths or Plating—Saves 10% to 30% on Floor Space.
3. New Aluminum Coating Method for Steel and Alloys.

WHY NOT ALLOCATE 2 HOURS OF EXTRA TIME AT DETROIT AS A PART OF FORWARD PLANNING.

THE A. F. HOLDEN COMPANY

3 F.O.B. Points for Holden Metallurgical Products

EXECUTIVE OFFICES AND PLANT	EASTERN PLANT	WESTERN PLANT
• 14341 SCHAEFER HIGHWAY, DETROIT 27, MICHIGAN	• 460 GRAND AVENUE, NEW HAVEN 13, CONN.	• 4700 EAST 48th STREET LOS ANGELES 58, CALIF.

etals Review

The News Digest Magazine

March 1958
Vol. XXXI, No. 3

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Important Lectures

Departments

ASM Review of Metal Literature

Allen G. Gray Appointed Editor *Metal Progress*

Allen G. Gray, formerly technical editor, *Steel,* has been appointed editor of the A.S.M.'s technical publication *Metal Progress.* He took over his new position on Feb. 1. Ernest E. Thum, editor since the foundation of the magazine in 1930, assumes the title of editor-in-chief, Marjorie Rud Hyslop, closely associated with *Metal Progress* since the beginning and officially the managing editor since 1952, retains her position and title, and her work will be supplemented by that of Carl R. Weymueller, newly appointed assistant editor, and Dave Ritchie, assistant editor.

Allen Gray is well grounded both in the engineering and the editorial demands of the new position. He was a consulting editor and frequent contributor to *Steel* from 1942, and became technical editor of *Steel* in 1952. He is 42 years old, a graduate in both chemistry (B.S.) and metallurgy (M.S.) from Vanderbilt University of Tennessee, with a Ph.D. degree in chemistry from the University of Wisconsin in 1940. His postgraduate studies were on molybdenum steels and tungsten alloys.

The 12 years between graduation and taking up editorial work with *Steel* were in the employ of the du Pont Co., working at one or another of the manifold problems of metal processing, primarily their chemical aspects. In the early 1940's he was active in the development of the fast electrotinning process to conserve scarce tin, in the perfection of aircraft engine bearings and in the electropolishing of stainless steels. He is largely responsible for the commercial electropolishing process now in wide use. In the later war years he was loaned to the Metallurgical Laboratory at the University of Chicago and was part of the team which solved the critical problem of canning the uranium slugs for the Hanford atomic piles. During part of 1951-52, he was associated with du Pont's Atomic Energy Division on special assignment with the Knolls Atomic Power Laboratory of the Atomic Energy Commission. His continuing interest in developments of the atomic age is shown by his membership in the A.E.C.'s Advisory Committee on Industrial Information and in the Governor's Advisory Council on Atomic Energy of the State of Ohio.

It is expected that under the editorship of Dr. Gray *Metal Progress* will continue the growth it has enjoyed since its founding and that it will continue to carry out the aims set at its founding . . . to collect and print the vital information about the expanding world of metals necessary for the wide-awake metals engineer to meet his ever-widening obligations.

Compares Plastics and Metals

C. Coleman Fisher, Electro Metallurgical Co., Spoke on "Metals and Plastics" at a New Jersey Meeting. At right is technical chairman S. Lindstrom

Speaker: C. C. Fisher
Electro Metallurgical Co.

Members of the **New Jersey Chapter** heard a talk entitled "Metals and Plastics" prepared by A. R. Lytle, a flu casualty, for whom C. Coleman Fisher spoke. Both are with the Electro Metallurgical Co.

Mr. Coleman presented information on the characteristics and properties of a number of plastics with comparisons to metals. He emphasized that the word "plastics" should be used only in a general sense. Many different materials are possible which can be classified into 14 basic family groups.

Compared to metals, most plastics have outstanding chemical resistance. Their principal limitation is their inability to withstand high temperatures. A curious limitation of plastic pipe is that some animals find it unusually tasty.

Plastics become strongly competitive to metals for structural use when reinforced with glass fiber and other high-tensile strength materials. Compared with aluminum and its alloys on a volume basis, reinforced plastics have about the same range in tensile and compressive strength. There are glass-impregnated plastics with tensile strengths of 50,000 psi. which have strength-to-weight ratios comparable to that of aluminum and titanium alloys. A restriction to structural use of reinforced plastics is their low modulus of elasticity compared to most metals.

Plastics applications of particular interest to metallurgists are:

1. Where an article with compound curvature is to be made and the run is too short to permit amortization of metal dies.
2. Where the greatest possible strength-to-weight ratio is to be achieved.
3. Where a severe corrosion problem exists.
4. In making forming tools, particularly where the cost of steel tools would be excessive.
5. When dimensional stability and transparency are simultaneously required.
6. To increase the rigidity of hollow members by filling them with a rigid foam.
7. Where thermal insulating properties are required.

—**Reported by Arnold Klein for New Jersey Chapter.**

A Mightier World Through Metallurgy

A.S.M. Photocopy Service

With this issue of *Metals Review,* a new service is being initiated by the American Society for Metals for its members and readers. It is now possible to order copies of certain papers which are annotated in the monthly A.S.M. Review of Metal Literature.

Only those articles marked with an asterisk just preceding the title are available for reproduction. These are the papers judged to be of greatest importance from the standpoint of permanent reference and bibliographic value.

Starting with the January 1958 issue all articles marked with an asterisk are available as photocopies, in compliance with the instructions given in the coupon on page 63. Please *read these instructions carefully* and use the coupon for ordering photocopies.

Western Groups A. S. M. — A. I. M. E.

Join Forces to Present Four-Day Conference

The A.I.M.E. Mining and Metals Branches and the Los Angeles and San Fernando Valley Chapters A.S.M., will co-sponsor a four-day conference dedicated to the "Properties, Fabrication and Application of High-Temperature Materials", and "Molybdenum Fabrication". A comprehensive program of interest to all professional engineers has been arranged for May 5 to 8, 1958, at the Ambassador Hotel, Los Angeles, Calif.

Thirty-six important papers will be presented at ten different sessions. A number of distinguished speakers will preside at special events. Much of the information is being presented to the public for the first time and represents the results of the most recent research and development activities.

Registration will start at 8 a.m., Monday, May 5, at the Ambassador Hotel, Los Angeles, Calif.

A complete schedule of the Conference follows:

A.I.M.E. HIGH-TEMPERATURE MATERIALS CONFERENCE

Monday, May 5

8:30 a.m.

CURRENT RESEARCH

Chairman: J. M. Denney, Aeronutronic Systems, Inc., and California Institute of Technology

Mechanical Properties of Refractory Oxides, by Roger Chang, Atomics International, North American Aviation.

High-Temperature Strength and Creep in Graphite, by Howard Martens, Jet Propulsion Laboratory, California Institute of Technology.

Strength and Low-Temperature Creep, by R. D. Chipman, Atomics International, North American Aviation.

10 a.m.

Introduction—Metals and Mining Joint Session.

Geology and Resources of Minerals of the High-Temperature Metals, by R. M. Foose, Stanford Research Institute.

The Refractory Metals Tungsten, Molybdenum, Columbium and Nickel, by L. Ynetema, Stanford Research Institute.

LUNCHEON

12 noon

FREE WORLD RESOURCES AND ECONOMICS OF HIGH-TEMPERATURE METALS, by J. W. Vanderwilt, Colorado School of Mines.

2 p.m.

Metals Branch

HIGH-TEMPERATURE ENVIRONMENTAL PROBLEMS

Chairman: F. E. Marble, California Institute of Technology; Co-Chairman: J. Waseman, Douglas Aircraft Co.

Thermodynamic High-Temperature Objectives, by R. W. Bromberg, Ramo-Wooldridge Corp.

Materials for Containment of High-Temperature Reactions, by A. V. Levy, Marquardt Aircraft Co.

High-Temperature Material Limitations, by N. N. Ault, Norton Co.

2 p.m.

Mining Branch

GEOLOGICAL RELATIONSHIPS OF HIGH-TEMPERATURE METALS

Geochemistry of Rhenium, by Michael Fleischer, U. S. Geological Survey, Washington, D. C.

The Riddle Nickel Project: Oregon, by John K. Gustafson, M. A. Hanna Co.

Geology of the Searles Lake Deposits With Special Reference to Tungsten, by D. E. Garrett and L. G. Carpenter, American Potash and Chemical Co.

Molybdenum, by Stewart Wallace, Climax Molybdenum Co.

Tungsten, by representative of U.S.G.S., Menlo Park.

BANQUET

7:30 p.m.

A METALLURGICAL AND PHILOSOPHICAL TOUR OF RUSSIA,

by N. J. Grant, Massachusetts Institute of Technology. (Ladies Invited)

Tuesday, May 6

9:30 a.m.

PROGRESS IN HIGH-TEMPERATURE METALLURGY

Chairman: N. E. Promisel, Bureau of Aeronautics, U. S. Navy

Behavior of Ceramics at High Temperature, by N. J. Grant, Massachusetts Institute of Technology.

High-Temperature Structural Properties, by L. Jaffee, Jet Propulsion Laboratory, California Institute of Technology.

Trends in Refractory Metals, by J. J. Harwood, Office of Naval Research.

High-Temperature Oxidation, by E. M. Mahla, E. I. du Pont de Nemours Co.

Electron Gun Furnace, by Charles Hunt, Stanford Research Institute.

LUNCHEON

12 noon

HIGH-TEMPERATURE SOURCES IN RESEARCH, by G. M. Gianinni, Gianinni Research Laboratory

2 p.m.

THEORY OF HIGH-TEMPERATURE EFFECTS

Chairman: Pol Duwez, California Institute of Technology

Mechanical Properties of Ceramics, by E. R. Parker, University of California.

Strength of Refractory Metals, by R. W. Guard, General Electric Research Laboratory.

Slip and Pinning at High Temperature (speaker to be announced).

Physical Properties in the Nonmetallics, by John Hove, Atomics International, North American Aviation.

Wednesday, May 7

A.S.M. MOLYBDENUM FABRICATION CONFERENCE

9 a.m.

INTRODUCTION

Chairman: N. E. Promisel, Bureau of Aeronautics, Department of the Navy

Molybdenum as a Structural Material, by J. J. Harwood Office of Naval Research.

Development of Molybdenum Alloys—Present and Future, by G. A. Timmons, Climax Molybdenum Co.

Production and Quality of Molybdenum Mill Products, by W. L. Bruckart, Universal-Cyclops Steel Corp.

LUNCHEON

12 noon

Speaker: M. C. Demler, Brigadier General, U.S.A.F., Deputy Commander, Research and Development, Air Research and Development Command, Baltimore, Md.

2 p.m.

FABRICATION

Chairman: I. Perlmutter, Wright Air Development Center

The General Electric Molybdenum Bucket Story

Part I: Testing in the "Hot Rod" Engine, by R. C. Downey, General Electric Co.

Part II: Development and Engine Evaluation of Protective Coatings, by M. A. Levinstein, General Electric Co.

(Continued on p. 6)

Announce Gregory Award

Plans for the 1958 Gregory Award for the year's outstanding contribution to the advancement of electric arc stud welding were announced today by Gregory Industries, Inc.

A five-man jury headed by Clarence H. Lorig, vice-president A.S.M. and assistant director of Battelle Memorial Institute, will select the winner of the $1500 cash award, according to George E. Gregory, president of the sponsoring firm which manufactures Nelson stud welding products. The judges, the balance of whom are to be named by G. M. Young, president A.S.M. and technical director of Aluminum Co. of Canada, will make the award to "the person responsible for the development of stud welding applications or studs which shall be judged most significant" on the basis of:

1. Reducing costs for industry, or
2. Improving the appearance, serviceability and life of a product or structure, or
3. Performing a function not possible by any other method.

Three Paris "Metro" subway engineers won the first Gregory competition in 1957 for their use of stud welding in the conversion of subway track for the operation of noiseless rubber-tired trains. They documented savings of $85,600 or 68% of the track fastening cost.

Entry blanks and information on this competition may be obtained from Gregory Industries, Inc., Lorain, Ohio. Entries should be mailed to Dr. Clarence H. Lorig, Chairman, Gregory Award Committee, c/o American Society for Metals, 7301 Euclid Avenue, Cleveland 3, Ohio, and must be postmarked before midnight July 31, 1958.

The award will be presented at the third annual A.S.M. awards luncheon in Cleveland, Oct. 28, 1958.

Titanium Production Is Summarized at Purdue

Speaker: D. Evers

Mallory-Sharon Titanium Corp.

"Titanium" was the title of a talk presented by Dillon Evers, manager of research, Mallory-Sharon Titanium Corp., at a meeting at Purdue.

Dr. Evers gave a brief historical account of titanium, followed by a short description of the processes used in producing pure titanium. The melting of titanium sponge into a usable form and the alloying of titanium were then covered.

The speaker described the consumable electrode melting process which takes place by an arc and in vacuum. Two first-stage ingots are welded together to form the electrode for second-stage melting. The first-step electrodes weigh up to 4000 lb., the second-stage electrodes may be as heavy as 8000 lb.

The chemical and mechanical properties of titanium were then described. The high corrosion resistance, affinity for atmospheric gases, mechanical working difficulties and tensile and creep strengths of titanium and its alloys were also covered.

Dr. Evers summarized his talk by indicating that present research shows that titanium will probably be used to the greatest extent in specialized structural applications.—**Reported by Terrance Lindemer for Purdue Chapter.**

Forging of Molybdenum and Its Alloys, by J. Russ, Steel Improvement and Forge Co.

Forming Molybdenum Sheet, by D. C. Coldberg, Westinghouse Electric Corp.

Thursday, May 8

9 a.m.

JOINING

Chairman: W. N. Platte, Westinghouse Electric Corp.

Fusion Welding Molybdenum, by D. C. Martin, Battelle Memorial Institute.

Brazing Molybdenum, by G. S. Hoppin, General Electric Co.

Ultrasonic Welding, by J. B. Jones, Aeroprojects, Inc.

LUNCHEON

12 noon

PANEL DISCUSSION—INDUSTRY REQUIREMENTS

Chairman: A. V. Levy, Marquardt Aircraft Co.

Missile Structures and Power Plants, by J. M. Siergiej, Marquardt Aircraft Co.

Nuclear Energy, by C. C. Woolsey, Atomics International.

Electronic Equipment, by H. L. Myers, Raytheon Manufacturing Co.

Chemical Processing Industry, by E. Edwards, Standard Oil Co. of California.

2 p.m.

GENERAL FABRICATION

Chairman: N. L. Deuble, Climax Molybdenum Co.

Protective Coating Systems for Molybdenum, by R. I. Jaffee, Battelle Memorial Institute.

Fabrication of Electronic Components, by R. Yancy, Fansteel Metallurgical Corp.

Machining of Molybdenum and Its Alloys, by W. A. Taebel, Westinghouse Electric Corp.

Press Extrusion of Molybdenum Tubing and Shapes, by R. A. Quadt, Hunter Douglas Division, Bridgeport Brass Co.

ADVANCE REGISTRATION AND RESERVATION

AIME High Temperature Materials and Their Resources Conference
ASM Molybdenum Fabrication Conference

Fill out and mail this form to:
Mr. C. W. Six, Treasurer
c/o Cyprus Mines Co.
523 W. 6th St.
Los Angeles, California

Please make advance registration and reservations for the AIME-ASM Conferences, May 5 to 8, for:

Name ____________________

Address ____________________

			Total				Total
Registration	______	@ $5.00	______	Luncheon, May 6	______	@ $4.00	______
Luncheon, May 5	______	@ $4.00	______	Luncheon, May 7	______	@ $4.00	______
Banquet, May 5	______	@ $7.50	______	Luncheon, May 8	______	@ $4.00	______

☐ I will pick up and pay for the above at the Conferences.

☐ I have attached my check for the total indicated above, less 10% if I take advantage of the special pre-Conference payment plan. (Check must be received prior to Apr. 15.)

Cites Advances in High-Strength Steels

George A. Roberts, Vanadium-Alloys Steel Co., and Past President A.S.M., Discussed "New Developments in High-Strength Steels" at a Joint Meeting of the Kansas City Chapters A.S.M. and A.S.T.E. Pictured are, front, from left: Ralph Adkins, Vendo Co., A.S.T.E. chairman; Dr. Roberts; and D. C. Goldberg, A.S.M. chairman. Rear, from left, are: Winton Jensen, A.S.T.E. program chairman; Dick Bardes, Vanadium-Alloys St. Louis Manager; and Harold Hartman, toolsteel manager, Marsh Steel Corp., distributors

Speaker: G. A. Roberts
Vanadium-Alloys Steel Co.

George A. Roberts, vice-president-technology, Vanadium-Alloys Steel Co., and past national president A.S.M., presented a talk on "New Developments in High-Strength Steels" at a meeting held by the **Kansas City Chapter.**

Dr. Roberts traced the research program at Vanadium-Alloys Steel Co. which led to the development of VascoJet 1000 and other ultra-high strength steels. The new concept applied was to base the development work on current knowledge of extremely high-alloy steels having air hardening and secondary hardening characteristics and developing from them materials with a minimum of strategic alloy content that would retain the needed resistance to tempering and high-temperature strength, along with sufficient ductility for aircraft and missile applications.

As a basis the well-known high-speed steels, which at strengths represented by hardnesses over Rockwell C-60 have the highest toughness or ductility of any engineering material. The effect of chemical composition changes on the properties of high-speed steel, particularly the effect of high vanadium on wear resistance and of molybdenum on toughness, was also described.

The 5% chromium air hardening steels, such as VascoJet 1000, represent the minimum in alloy content for operating conditions up to 900 or 1000° F., and their properties were described in detail. Applications of such a steel to high-temperature fasteners, aircraft rotors, compressor blades and aircraft structural parts, such as landing gear, etc., were illustrated with colored slides.

Dr. Roberts indicated the need for future study to extend the range of useful materials beyond the 260,000 to 300,000 psi. strength range made possible by VascoJet 1000. He expressed little hope, however, for being able to supply materials having strengths of up to 400,000 psi. without very careful cooperation of design and manufacturing engineers to take full advantage of the measurable, but limited ductility that such materials will have.—**Reported by W. H. Deterding for Kansas City.**

—Metallurgy—Service Today for Mankind Tomorrow—

Nominating Committee for A.S.M. National Officers

In accordance with the Constitution of the American Society for Metals, President G. M. Young has selected a nominating committee for the nomination of president (for one year), vice-president (for one year), secretary (for two years), and two trustees (for two years each). This committee was selected by President Young from the list of candidates submitted by the chapters. The personnel is: Chairman: Robert F. Thomson (Detroit Chapter), General Motors Corp., Research Staff, P.O. Box 188, North End Station, Detroit 2, Mich.; J. P. Fowler (North Texas Chapter), 3901 Hemphill St., Fort Worth 9, Tex.; David Goldberg (Kansas City Chapter), Westinghouse Electric Corp., P.O. Box 288, Kansas City, Mo.; Robert B. Gordon (San Fernando Valley Chapter), 19322 Superior St., Northridge, Calif.; John Kahles (Cincinnati Chapter), Metcut Research Associates of Cincinnati, 3990 Rosslyn Dr., Cincinnati 9, Ohio; George F. Kappelt (Buffalo Chapter), R.F.D. No. 2, Lockport, N. Y.; Blake D. Mills, Jr. (Puget Sound Chapter), Mechanical Engineering Dept., University of Washington, Seattle, Wash.; William A. Mudge (New York Chapter), International Nickel Co., 67 Wall St., New York, N. Y.; and Wilhelm Olson (Rockford Chapter), Atwood Vacuum Machine Co., Rockford, Ill.

The committee will meet during the third full week in the month of May. It will welcome suggestions for candidates in accordance with the A.S.M. Constitution, Article IX, Section 1(b), which provides that endorsements of a local executive committee shall be confined to members of its local chapter, but individuals of a chapter may suggest to the nominating committee any candidates they would like to have in office. Endorsements may be sent in writing to the chairman or any member of the committee.

—ASM Educational Services for Metaldom—

OBITUARIES

ROBERT WAGER, inventor and industrialist, died in January at the age of 76. Mr. Wager, a member of the New Jersey Chapter, was the owner of the Robert H. Wager Co.

◆ ◆ ◆

ELWOOD SPENCER, a member of the Akron Chapter, employed for the past 12 years as a chemist in the quality control department, Babcock & Wilcox Co., died in January.

◆ ◆ ◆

WILLIS R. WHITNEY, an Honorary Member A.S.M., died early in January at the age of 89. In 1900, Dr. Whitney founded the General Electric Research Laboratory, and served as its director for 32 years, a period during which scientists under his leadership made many of the major discoveries that helped to bring electricity into homes and factories throughout the world. He was an honorary vice-president of the General Electric Co.

Dr. Whitney was born in Jamestown, N. Y., in 1868. He graduated from Massachusetts Institute of Technology in 1890 and received his Ph.D. in chemistry from the University of Leipzig, Germany, in 1896. Following his graduation, Dr. Whitney taught for several years at M.I.T. In 1900 he went to General Electric where he served in various capacities until he retired in 1932 from the directorship of the laboratory, and in 1941 from the vice-presidency. Since that time he had continued research in the capacity of honorary vice-president and consultant to the laboratory.

Meet Your Chapter Chairman

BALTIMORE

SELDEN C. HAYES was born in Cleveland, Ohio. He holds B.S. and M.S. degrees in metallurgy from Columbia University and worked as superintendent of heat treating, metallurgist and research assistant before taking his present position as technical assistant to the general superintendent at Armco Steel Corp.'s Baltimore works. His previous chapter activities have been as chapter reporter and chairman of the finance and meetings committees.

Mr Hayes is a director of the Maryland Institute of Metals, and a member of other technical societies, and takes an active interest in the affairs of his own community as committeeman in Cub Scouts and in the Volunteer Fire Department. He is a member of his church board and teaches Sunday school.

He and his wife, Elizabeth, have two sons, Willard, 10, and Kenneth, 7, and a daughter Pamela, 9 years old. Other interests are photography and hi-fi, and "trying to raise grass".

COLUMBIA BASIN

RICHARD B. SOCKY was born in Cleveland, Ohio, and earned his B.S. degree in chemical engineering at Fenn College located there. He worked in the physical testing laboratory of American Steel & Wire Co., as apprentice engineer at the General Chemical Co., and as supervisor in the physical test, X-ray and metallographic laboratory of General Motors Corp., before returning to his education at University of Michigan where he earned an M.S. degree in metallurgical engineering.

Dick joined General Electric Co. at Richland in 1947 and, after having served in many engineering capacities, is now manager, radiographic testing, Hanford Laboratory Operation. He has held various offices and performed many committee responsibilities for his A.S.M. chapter, and is currently vice-chairman of the Pacific Northwestern section of the S.N.T.

The Socky family, which includes Sharon Lee, 8, David, 6 and Debra Ann, 3 years old, spends much of its summer time camping, prospecting and exploring.

Dick and his wife Ella are very active in the Richland Sword and Mask Club and both have earned reputations in the Northwest as experts with the epee.

ST. LOUIS

RICHARD D. BARDES, born in Kansas City, has a B.S. degree from the University of Pittsburgh, and upon graduation joined Vanadium-Alloy Steel Co., where he is now district manager of the St. Louis office.

Previous services in A.S.M. include chairman of the membership, entertainment and program committees, as well as secretary and vice-chairman. He is also a member and has been a chapter secretary in the local A.S.T.E. group.

Mr. Bardes was an American conferee at the Second World Metallurgical Congress in 1957. He and his wife, Lila, have a son, Ricky, two years old. Dick likes to hunt, fish and play golf. During World War II he served in the Army.

SAVANNAH RIVER

W. LESLIE WORTH, area supervisor for the duPont Co. at the Savannah River Atomic Energy Plant, is a native of Haddonfield, N. J. He is a graduate of the Colorado School of Mines with a degree of engineer of mines, and later received a mechanical engineering degree and M.S. in metallurgical engineering from the University of Pennsylvania. His first job was with Midvale Steel Co., working under the direction of F. B. Foley, past national president, A.S.M.

During World War II, Mr. Worth worked with high-temperature alloys and on the production of radar components and electrical switch gear for the Navy. Since 1945 he has been associated with the nonferrous aspects of metallurgy in such fields as lithium, beryllium and aluminum. His favorite hobby is breeding and exhibiting fancy pigeons, and he travels so he can take 8-mm. movies.

PEORIA

JOHN G. FRANTZREB, metallurgical engineer at the general office of the Caterpillar Tractor Co., was an officer in the Army for four years in the Ordnance Department, and in fire control, computers and instrumentation work.

Born in Morrocco, Ind., he is a graduate of Indiana University, and worked as chemist, metallurgist and supervisor of heat treating before assuming his present position.

Mr. Frantzreb was on a number of committees in the Indianapolis Chapter before coming to the Peoria Chapter where he has served on the educational committee. He has also been program chairman and vice-chairman. He is a member of A.S.T.M. and active in S.A.E.

His family consists of three boys and three girls. Recreational interests are golf, photography and nutriculture.

PUGET SOUND

C. B. (BARNEY) HOLDER was born in Evansville, Ind. During high-school days there he was on the track team and took part in cross-country running. In 1937 he joined Eagle Metals Co. in sales and service. He is still with the company as assistant vice-president.

Barney enlisted during World War II, was later commissioned and served about six years. Just recently he resigned his commission as major in the Air Force Reserve. During the 1956-57 season he was coordinator of the Northwest Chapters speakers circuit, and has been secretary-treasurer, vice-chairman and a member of the executive committee of the Puget Sound Chapter. He and his wife Lucille have two sons, Peter, three, and Paul, 10 years old. Barney's one complaint is that he would like to have enough spare time to play golf and fish more than at present.

S. C. Hayes

R. B. Socky

J. G. Frantzreb

R. D. Bardes

W. L. Worth

Announce Southern Metals Conference

The Southern Metals Conference started as a three-chapter affair and has grown to a regional meeting of over ten A.S.M. chapters covering the Southeastern United States. Although relatively new in the South, the metallurgical profession is growing rapidly and attendees of previous Conferences have found discussions of mutual problems and work done by other chapters very advantageous.

Technical sessions, to be held Apr. 21-22, of the 1958 Southern Metals Conference will focus on the "Forming of Metals". Hot and cold working of plain carbon steel, stainless steel, aluminum, zirconium, titanium, and new advances in machining, powder metallurgy, and investment casting will be presented by an outstanding group of well-qualified speakers. These include:

J. Warren Stewart, Applied Research Laboratory, U. S. Steel Corp., on steel sheet production from the cast billet to end product.

Charles R. Mayne, Development and Research Division, International Nickel Co., on fabrication of stainless steel.

J. E. Doughty, Alloy Tube Division, Carpenter Steel Co., on production of seamless stainless steel tubing and shop fabrication of titanium and zirconium tubing.

Sheldon E. Weinig, Materials Research Corp., on the differences in fabricating hexagonal metals like zirconium and titanium in comparison with body or face-centered cubic metals.

Carl J. McHargue, Oak Ridge National Laboratory, on the importance of controlling grain orientation in metal forming.

John Preston, Austenal Co., on applications, production control and advances in investment casting.

John H. Coobs, Oak Ridge National Laboratory, on powder metallurgy forming of materials which can not be fabricated by more conventional techniques and products satisfying certain unique property requirements.

Robin O. Williams, Cincinnati Milling Machine Co., on recent advances in machining such as the electro-discharge technique and new methods of sharpening drills and cutting ceramics.

An interesting and timely highlight will be provided by Nicholas J. Grant of Massachusetts Institute of Technology with a candid presentation of his impression of the state of metallurgy and the caliber of metallurgists in Russia based on a recent tour in the U.S.S.R.

Robert A. Charpie, assistant director, Oak Ridge National Laboratory, will be the dinner speaker the evening of Apr. 21 with a discussion of the "Impact and Effect of Fission and Fusion Energy on Our Personal and Professional Lives".

G. M. Young, technical director, Aluminum Co., of Canada, and National President A.S.M., will be the dinner speaker on Apr. 22. He will talk about Canada's natural resources, with particular emphasis on the development of hydro-electric power by the Aluminum Co. of Canada at Kitimat.

Outstanding science projects by high-school students of the East Tennessee area will be on display during the two-day technical session.

A tour of the Oak Ridge National Laboratory has been arranged for Apr. 23. The Laboratory is operated by the Union Carbide Corp. for the U. S. Atomic Energy Commission. This visit should be of interest for several reasons. ORNL is the site of the world's first permanent nuclear reactor, the X-10 Graphite Reactor, which was designed and built as a pilot plant for the large-scale plutonium-producing reactors at Hanford, Wash. The X-10 is currently the world's largest producer of radioactive isotopes for research in the fields of biology, medicine, agriculture, industry, etc. ORNL also has the largest known research reactor. The ORNL tour will be available to registered conferees only.

Special arrangements have been made for the ladies with the Mountain Craft Association for a guided tour of representative industries in the Gatlinburg area. In addition, the Park Rangers will describe and illustrate the many scenic beauties in the Smoky Mountain National Park which should be especially attractive at that time.

We think the 1958 Southern Metals Conference will be educational, interesting, and thoroughly enjoyable for A.S.M. members and their wives. Anyone interested in attending will be most welcome. Inquiries should be addressed to: D. A. Douglas, Jr., Chairman, 1958 SMC, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, Tenn.

Details Applications of Nodular Iron

Thomas E. Eagan, Chief Research Metallurgist, Cooper-Bessemer Corp., Spoke on the "Applications of Nodular Iron" at a Meeting in Dayton. Shown are, from left: Lester Crome, Dayton Malleable Iron Co; Walter J. Ridd, vice-chairman; Mr. Eagan; and William T. Bryan, chairman

Speaker: T. E. Eagan
Cooper-Bessemer Corp.

Thomas E. Eagan reviewed the many varied "Applications of Nodular, or Ductile, Iron", which include the range from small pistons to massive engine blocks at a meeting of **Dayton Chapter.** The chief research metallurgist of the Cooper-Bessemer Corp., he has been closely associated with ductile iron since its original development.

Mr. Eagan discussed the influence of subversive agents such as lead, tin, antimony and titanium which interfere with the proper nodule formation of the graphite. These subversive agents lower the mechanical properties of the final cast product. Cerium, in the form of mischmetal, is added to the melt to overcome the detrimental effects of the subversives.

Low-sulphur pig iron is used in the melting practice since a high-sulphur content is detrimental to the mechanical properties. By using magnesium additives, the sulphur content can be lowered. At the same time the magnesium addition modifies the form and distribution of the graphite upon solidification. For these reasons magnesium has largely supplanted the rare earths.

The attractive properties of nodular iron, such as good high-temperature heat resistance, good notch fatigue resistance, excellent wear resistance and good machinability were presented by means of specific applications.—**Reported by Joseph J. Warga for Dayton.**

Ultrasonic Welds Topic in Washington

At the Joint Meeting of the Washington Chapters A.S.M. and A.W.S. J. Byron Jones, President, Aeroprojects Inc., Presented a Talk on "Ultrasonic Welding of High-Temperature and Corrosion-Resistant Materials". He is shown left, receiving a certificate from Henry Stauss, chairman

Speaker: J. Byron Jones
Aeroprojects Inc.

J. Byron Jones, Aeroprojects Inc., spoke on "Ultrasonic Welding of High-Temperature and Corrosion Resistant Materials" at a joint meeting of the **Washington Chapters** A.S.M. and A.W.S.

The history of ultrasonic welding originated and developed by Aeroprojects during the past five to eight years was summarized. Graphs were presented showing progressive improvements in this vibratory welding process since 1954, when only 0.010-in. 1100-H14 aluminum could be joined to meet the strength requirements of MIL-W-6860, and none of the structural aluminum alloys in any gage could be welded to meet this specification. At present, ultrasonic welds of adequate strength can be produced in 1100 aluminum 0.070-in. thick, and 0.060-in. bare and 0.060-in. Alclad structural alloys can be joined with strengths almost double those required in the military specification.

It was pointed out that ultrasonic welding is developing in the direction of accomplishing spot-type junctions in heavier and harder materials, in seamweld-making machinery to handle foil and sheet gages of various metals and alloys, toward making jewelry-like weldments as exemplified by vacuum-tube components, transistor assemblies, foil coils, and the like, and toward joining a variety of geometries of various sizes.

Mr. Jones emphasized that ultrasonic welding can be used to join the more exotic metals, such as molybdenum, columbium, tantalum, zirconium, titanium, Inconel, Inconel X, and 17-7 PH stainless steel in sheet gages up to about 0.030 in. Emphasis was placed on the fact that ultrasonic welding usually results in a high degree of internal deformation at the faying surfaces being joined without any particular external deformation.

It was furthermore stated that good bimetal junctions can be produced with such combinations as nickel to molybdenum, Kovar to nickel, nickel to steel, aluminum to stainless steel, stainless steel to titanium, Zircaloy to stainless steel, tungsten to stainless steel and to low carbon steel, etc. As illustrated in representative photomicrographs such bimetallic joints are produced without formation of brittle intermetallics or metallurgical mixtures of unknown corrosion susceptibility that characterize the several fusion-type joining methods.—**Reported by R. M. Gustafson for Washington Chapter.**

Concept of Magnetism Is Subject at Golden Gate

Speaker: John C. Fisher
General Electric Co.

John C. Fisher, General Electric Co. Research Laboratory, presented a description of the "Fundamental Concept of Magnetism" at **Golden Gate.**

Dr. Fisher likened the spinning electrons to a "gas of arrows" confined in a single crystal the size of a room. It was explained that for ideal magnetic properties, the electrons must have their axes parallel to each other, parallel to the crystallographic direction and to any external magnetic field. When the external magnetic field is increased sufficiently, the direction of the spinning electrons conforms to the direction of this field regardless of the crystallographic direction. The theory of domain walls was explained and the friction involved in the movement of these domain walls was the basis of an explanation for magnetic hysteresis. The basic characteristics of soft and hard magnetic materials were discussed.

An interesting feature was the discussion of the relative efficiency of permanent magnets, and the possibility of obtaining 50 to 100% greater energy storage by applying the presently known principles of magnetism. This can be compared to a theoretical maximum improvement of 1000%. —**Reported by R. L. Nichols for Golden Gate Chapter.**

Technical Papers Invited for A.S.M. Transactions

The Transactions Committee of the A.S.M. is now receiving technical papers for consideration for publication in the 1959 Transactions and possible presentation before the next national meeting of the Society, to be held in Cleveland, Oct. 27 to 31, 1958.

Many of the papers approved by the Committee will be scheduled for presentation on the technical program of the 40th National Metal Congress and Exposition.

Papers may be submitted any time up to Apr. 21, 1958, for consideration for presentation at this convention. The selection of approved papers for the convention technical program will be made early in May 1958. Manuscripts may be submitted any time during the year and upon acceptance by the Transactions Committee will be processed immediately for preprinting. All papers accepted will be preprinted and made available to any members of the Society requesting them. However, the printing of an accepted paper does not necessarily infer that it will be presented at the convention. Under a new plan of the Society, preprinting of accepted papers is done quarterly. Notification of their availability is published in *Metals Review*.

Manuscripts in triplicate, plus one set of unmounted photographs and original tracings, should be sent to the attention of Ray T. Bayless, Assistant Secretary, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

Should it be your intention to submit a paper, please notify A.S.M. A copy of the booklet entitled "Suggestions to Authors in the Preparation of Technical Papers" will be gladly forwarded. This booklet may help considerably in the preparation of line drawings and illustrations.

Metallurgical News and Developments

A Department of *Metals Review*, published by the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio

Devoted to News in the Metals Field of Special Interest to Students and Others

Short Course—A course on "Mechanical Properties of Materials" will be held from July 7-11, 1958, at Pennsylvania State University. Subjects to be covered will include hardness of metals, plastic behavior of metals under simple and combined stress, creep resistance and high-temperature properties of metals, fatigue strength of metals, effects of radiation on metals, recent developments in testing machines and instrumentation, and metals under high-speed loading. Further information from: L. W. Hu or Joseph Marin, Dept. of Engineering Mechanics, The Pennsylvania State University, University Park, Pa.

Institutes Scheduled—Nine Institutes on Nuclear Energy for engineering educators will be held this summer under the sponsorship of the Atomic Energy Commission and the American Society for Engineering Education. The institutes will provide special training in the fields of nuclear energy and the nature of the nuclear reactor problems so that teachers can incorporate this material in their teaching programs. Further information from: W. Leighton Collins, Secretary, A.S.E.E., University of Illinois, Urbana, Ill.

International Meeting—An International Iron and Steel Meeting will be held in Liege, Luxembourg, Charleroi and Brussels from June 18 through June 28, 1958. The meeting is a combined effort of Le Centre National de Recherches Metallurgiques, le Groupement des Industries Siderurgiques Luxembourgeoises and le Groupement des Hauts Fourneaux et Acieries Belges.

Six-Ton Barrel — Pangborn Corp., Hagerstown, Md., has introduced a 72 cu. ft. Rotoblast barrel to blast clean loads of castings, forgings and heat treated parts weighing up to 6 tons in 5 min.

Adds Divisions — The American Foundrymen's Society has added a Ductile Iron Division and a Die Casting and Permanent Mold Division, to foster advancement in two of the fast-growing newer interests in the castings industry.

Doehler Award—The American Die Casting Institute, 366 Madison Ave., New York 17, N. Y., has announced the Annual Doehler Award for outstanding contributions to the advancement of the die casting process. The award consists of a plaque and a cash honorarium of at least $500. Entries should be submitted by Apr. 15.

Research Meetings—The Gordon Research Conferences for 1958 will be held from June 9 to Aug. 29 at Colby Junior College, New London, N. H., New Hampton School, New Hampton, N. H., and Kimball Union Academy, Meriden, N. H. Subjects to be covered include High-Temperature and/or High-Pressure Phenomena, and Microstructures, Their Origin and Influence on Properties. Information from: W. George Parks, Director, Dept. of Chemistry, University of Rhode Island, Kingston.

European Congress—The European Congress of Chemical Engineers will be held at Frankfurt, Germany, from May 31 to June 8. Theme will be "Nuclear Science and Technology". Information from: Dechema Frankfurt (Main) 7, Germany.

Cemented Carbide—Development of a machinable carbide has been announced by Sintercast Corp. of America, Yonkers, N. Y. Produced by powder metallurgy techniques, this material, known as Ferro-Tic, has a composite structure which can be annealed and quench hardened by conventional heat treating procedures.

Fresh Water—The U. S. Navy has announced a mechanical compression method for making fresh water from salt water using ice made from brine. Fresh-water ice crystals are separated from brine ice by compression method after single stage of freezing. Relatively simple production unit does the de-salting.

Announce Scholarships — Latrobe Steel Co. has announced its third annual Full Scholarship program in which three graduating high-school seniors with achievement in science and engineering from the Latrobe area will be awarded full college tuitions. The award includes an offer of summer employment in the company's laboratories and offices. Students desiring to pursue metallurgical, industrial and mechanical engineering will be given special consideration.

Heat Resistant — Continental-Diamond Fibre Corp., Newark, Del., has announced a new type of high-heat resistant "Delecto" laminates and Celoron molded parts for missile, rocket, aircraft and industrial applications involving operating temperatures up to 3500° F. or higher.

Honor White—University regents approved the naming of the auditorium in the Mortimer E. Cooley Bldg. on the North Campus at the University of Michigan as the Albert Easton White Auditorium as a tribute to the late Prof. White for his outstanding achievements. Prof. White was the first president A.S.M. Also, the Michigan Engineering Society and Affiliated Groups Student Loan Fund has received a contribution from the Michigan Engineering Society in honor of Prof. White, thus assuring five engineering colleges in Michigan that deserving engineering students can complete their technical training.

Changes Name — The formation of Mallory-Sharon Metals Corp., formerly Mallory-Sharon Titanium Corp., has been announced. The company, with plants in Niles and Ashtabula, Ohio, assumes the new name to reflect an expansion of products into zirconium and other special metals.

Expand Program — The Calumet Chapter A.S.M. has expanded its Scholarship Program to include Valparaiso, Harvey and Chicago Heights High Schools, and will increase the number of scholarships awarded each year. It also hopes to increase the participation in financial support so that gifted and needy students can be assisted and allowed to follow technical careers, and so that high-school faculty members may be made aware of the opportunities in the metals industry. Each scholarship will be in the amount of $400.

Defines Physics of Magnetic Materials

Richard M. Bozorth, Bell Telephone Laboratories, Spoke on the "Physics of Magnetic Materials" at a Recent Meeting of the New York Chapter. Shown are, from left: W. J. Kennelly, Jr., chairman; Dr. Bozorth; F. D. Malone, vice-chairman; and Leslie Siegle, chairman of program committee

Speaker: R. M. Bozorth

Bell Telephone Laboratories

The use of ferrites for magnetic materials has greatly increased their efficiency in recent years, according to R. M. Bozorth, Bell Telephone Laboratories, who spoke on the "Physics of Magnetic Materials" at a meeting of **New York Chapter.**

Dr. Bozorth traced the history of magnetic materials from 1890 to the present, highlighting the introduction of silicon steel, permalloy, air-quenched permalloy, permalloy with additions of molybdenum, chromium and copper, supermalloy, the ferrites and garnets. The advantages of each new material over previous best materials were outlined by Dr. Bozorth, who illustrated his talk with slides as well as movies. The latter showed electron microscope methods used in studying magnetics and the properties of new materials using colloids.

Dr. Bozorth stated that research on magnets has shifted. Over half of the research is now directed at ferrites and other nonmetallic materials. These have rapidly grown in volume over the past few years as a result of their success, primarily as material for television picture tube deflection yokes. Already the annual product has a value of about $15 million in the radio and television industry.—**Reported by L. W. Collins, Jr., for New York.**

O.S.U. Sets Conference

The fifth Annual Conference for Engineers and Architects, sponsored by the Ohio State University College of Engineering, is scheduled for Friday, May 2, 1958, on the campus.

Principal speakers will be Major General John B. Medaris, commanding general of the Army Ordnance Corps' Ballistic Missile Agency at Huntsville, Ala., and James C. Zeder, vice-president, engineering, and special advisor to the president of the Chrysler Corp.

Gen. Medaris will keynote the opening general session at 10 a.m. in Mershon Auditorium. Mr. Zeder will speak at the luncheon session in the ballroom of the Ohio Union. The Conference will officially open at 9 a.m. with registration at Mershon Auditorium. Following the luncheon, technical sessions are scheduled at 2 p.m. in the various departments of the College of Engineering. An innovation this year will be four general technical sessions, each sponsored jointly by a number of departments, which will run concurrently.

The departments of chemical, mechanical and welding engineering and physics will present discussions on nuclear engineering. The metallugical engineering department will have discussions on current trends in metallurgical development, mining engineering, mining production control, petroleum engineering, radioactivity well logging in Ohio, and photography as a tool in the solution of engineering problems.

Presents History of Cast Iron Pipe Manufacture

Speaker: Frank Dowd, Jr.

Charlotte Pipe and Foundry Co.

"The Manufacture of Cast Iron Soil Pipe" was the subject of a talk given by Frank Dowd, Jr., vice-president, Charlotte Pipe and Foundry Co., at a meeting held by the **Carolinas.**

Mr. Dowd first presented a history of his company's development, outlining many of the features of its progress and its physical plant, which had been visited by the members previous to the technical meeting.

The speaker then gave a history of sanitary waste systems, tracing their development from ancient Phoenician times to the present. The earliest record of the casting of iron pipe is that at a German foundry in 1526. The art of pipemaking soon spread westward, and cast iron pipe which was installed in 1664 for the fountains of Versailles is still in use today after 290 years of service.

The first cast iron pipe in America, imported from England and Scotland, was installed in the pressure supply systems of the larger cities, replacing the inefficient bored-log conduit. Around 1800, several foundries and pipe plants were built in America and local production of cast iron pipe for water and drainage soon became a major industry. In spite of the improvements and developments in metallurgy and material handling, the basic process of melting iron, preparing a sand mold and pouring this mold has remained strikingly similar to that used over a century ago.

Only in the past few years has an automatic process been developed for rapidly producing cast iron soil pipe mechanically with low labor cost. This is the so-called Herman process for centrifugally casting soil pipe in spinning sand-lined molds. In this process, molten iron is poured into a mold that is being spun at high speed, and the fluid iron is distributed evenly throughout the mold and held against the inner wall by the spinning action until it sets up or cools into a precision pipe. A concentric seamless tube with uniform wall thickness results. The spinning molds are lined with sand, which acts as a buffer between the hot iron and the metal walls of the mold and which slows the rate of cooling.

Mr. Dowd went on to explain the melting operation used at Charlotte Pipe and Foundry Co., covering handling of raw materials, charging the cupola and mixing schedules. Testing procedures were explained and emphasis was placed on the importance of final inspection before the pipes are coated and shipped.

Los Angeles Subject Is Minimum Weight Structures

Speaker: A. A. Lanzara

Convair

A joint meeting of the **Los Angeles Chapter** A.S.M. and the local group of the American Welding Society featured a talk by Albert A. Lanzara, Convair, who spoke on "Fabrication of Minimum Weight Structures for Elevated Temperatures".

Mr. Lanzara stressed the advantages of brazed or plastic bonded honeycomb sandwich structure for skin panels. Light-weight stainless steel skins can be produced for Mach-2 aircraft that will resist the high operating temperatures and which will not oilcan or wrinkle.

Testing of the Convair B-58 Hustler, which incorporates honeycomb panels in its skin structure, was shown by 16-mm. sound movie.—**Reported by C. H. Dickson for Los Angeles Chapter.**

Chicago-Western Schedules Seminar at Northwestern

The **Chicago-Western Chapter** will present its Third Annual Seminar at Northwestern University Technological Institute, Evanston, Ill., on Apr. 24. The Seminar will cover the subject of "High-Strength Materials". Talks to be presented include:

Fundamentals of the Strength of Metals, by John Brittain, associate professor, Metallurgy Department, Northwestern University.

Materials With Strength at Elevated Temperatures, by L. P. Jahnke, manager of metallurgical engineering, Applied Research Operation, Flight Propulsion Laboratory, Aircraft Gas Turbine Division, General Electric Co.

Progress in Understanding the Heat Treatment of Steel, by R. A. Grange, Edgar C. Bain Laboratory for Fundamental Research, U. S. Steel Corp.

Ultra-High Strength Steels, by D. C. Smith, chief metallurgist, Electrode Division, Harnischfeger Corp.

Embrittlement of High-Strength Steels, by E. P. Klier, Metallurgical Research Laboratory, Syracuse University.

Moderator of the morning session will be S. R. Callaway, chief metallurgist, Electro-Motive Division, General Motors Corp., while the moderator of the afternoon session will be J. D. Graham, chief materials engineer, International Harvester Co.

Cost of the Seminar will be $10, which includes the technical sessions, coffee break, luncheon and afternoon tea. For reservations contact: J. F. Schumar, Argonne National Laboratory, P.O. Box 299, Lemont, Ill.

Stresses Design Factors To Achieve Minimum Weight

Speaker: J. C. McDonald

Lockheed Aircraft Corp.

John C. McDonald, Missile Systems Division, Lockheed Aircraft Corp., presented a talk on "Design Factors for Minimum Weight Machines and Structures" at a meeting of the **Golden Gate Chapter.**

The design of minimum weight structures has become an extremely complicated problem for a number of reasons. A comparison of materials based on the old generalization of the ratio of tensile strength to density is completely inadequate. Even though operation is entirely at temperatures within the range endurable by humans, several questions must be answered to obtain an optimum compromise. A detailed study is required for those critical elements which will fail by buckling in compression. Some assurance must be found that the toughness, fatigue strength and corrosion resistance, as well as insensitivity to stress corrosion or hydrogen embrittlement, are adequate. For these reasons a number of materials of widely varying density must be considered to insure that minimum weight has been achieved. At the present time, magnesium, aluminum, titanium and various ferrous and other heavy metal alloys are used.

The value to the customer of a pound of weight saved may vary from .50 lb. in the ground transportation industry to $10,000 lb. for a research missile. Generally speaking, we can afford to spend a good deal on design calculations as well as cost of the raw material to achieve this saving. Under conditions of high-temperature operation, for example; aerodynamic heating, design costs are much higher because of the added dimensions, not only of temperature, but also of time. Both the deformation and the rupture strengths are strongly dependent on the rate or duration of loading.

As our designers continue to increase their experience with these problems we can expect substantial improvement in those machines and structures where light weight commands a premium price.—**Reported by Robert L. Nichols for Golden Gate.**

German Speaker Featured at Los Alamos

Friedrich Foerster, Owner and Director, Institute Dr. Foerster, Reutlingen, West Germany, Spoke on "Electromagnetic Test Methods" at a Joint Meeting of the Los Alamos Chapter A.S.M. and S.N.T. Shown are, from left: Gerald Tenney, technical chairman; John Bender, program chairman; Dr. Foerster; F. W. Schonfeld, chairman; and Dana E. Elliott, S.N.T. chairman

Speaker: Friedrich Foerster

Institute Dr. Foerster

At a joint meeting of the **Los Alamos Chapters** A.S.M. and S.N.T., Friedrich Foerster, owner and director of the Institute Dr. Foerster, Reutlingen, West Germany, was the guest speaker. Dr. Foerster was one of the leading German representatives at the 2nd World Metallurgical Congress and 2nd International Conference on Nondestructive Testing held in Chicago in November.

At the dinner, which was presided over by Fred W. Schonfeld, chairman of the Los Alamos Chapter A.S.M., Dana E. Elliott, chairman of the Los Alamos Section S.N.T., presented a past-chairman's certificate to D. E. Grimm. Gerald Tenney, technical chairman, introduced the speaker to the group, which included representatives from Britain and France who had also been conferees at the 2nd W.M.C. Dr. Tenney brought out the fact that Dr. Foerster is known throughout the world as the leading man in the relatively new field of eddy current and electromagnetic testing. For his achievements in these test methods he received the S.N.T.'s DeForest Award, the first scientist outside the United States to receive this honor.

Dr. Foerster spoke on the "Latest Data on Electromagnetic Test Methods and Their Application to Metallurgy". He opened his talk with a general description of eddy currents and their characteristics as applied to instrumentation for specific uses.

A complete set of slides covering the electrical theory, instrument block diagrams, and practical applications of his commercial instruments accompanied his presentation.

Dr. Foerster reviewed the conductance meter and described instruments for automation which include automatic sorters encompassing the parameters of dimension, conductance, hardness, permeability and coating thickness. He then discussed instruments that determine internal stress, microcracks, surface cracks, grain flow or orientation, and stress-strain metering by precision measurements of d-c. magnetic fields. He also described a method to determine elastic constants of materials, to detect, for example, phase changes and intercrystalline corrosion.

In closing, Dr. Foerster pointed out that all the instruments are direct reading and may be applied to feedback systems to permit automatic control of processing.—**Reported by R. W. Kell for Los Alamos.**

Explains Ultrasonic Cleaning Process

Frank W. Hightower, Branson Ultrasonic Corp., Who Spoke on "Ultrasonic Cleaning and Pickling" at a Meeting Held by the Carolinas Chapter, Is Shown at the Speaker's Rostrum, While Jim Thatcher, Dick Tillman, Chairman Rudy Polivka and Mike Milo Listen. (Photograph by Bill Cheshire)

Speaker: F. W. Hightower
Branson Ultrasonic Corp.

"Ultrasonic Cleaning and Pickling" was the title of a talk presented by Frank W. Hightower, staff engineer, Branson Ultrasonic Corp., at a meeting of the **Carolinas Chapter.**

In ultrasonic cleaning, when dirty metal parts are immersed in an ultrasonically cavitated bath, the dirt is transferred from the metal surface to the solution in the tank, soluble components go into solution and insoluble dirt gets scattered through the liquid. Some particles, if heavy enough, may settle out, or the insoluble matter may be filtered out. But, in practically every case, cleaned work parts lifted from the tank will be dripping liquid that carries suspended dirt, which must be flushed off with a thorough rinsing. Ultrasonically cavitated liquids clean metal surfaces by a mechanical action—erosion—and by greatly accelerating any solvent or chemical attack that the liquid may have on the contaminant, but the liquid must actually wet the surface.

Of the several ways of rinsing these parts, one or more ultrasonic rinses following the primary cleaning stage are recommended.

The combination of chemistry and ultrasonics is being used routinely in cleaning, degreasing, pickling and rinsing operations in many factory-scale installations. Increasingly wider use of ultrasonic techniques has followed the development of rugged, dependable generators and the availability of ceramic transducers in corrosion and erosion-resistant housing.

The essential requirements of a satisfactory installation for ultrasonic cleaning are: an input of high-frequency energy adequate to initiate and maintain cavitation; a liquid with suitable physical and chemical properties to attack the dirt rather than the base metal; and a mechanism for conveying the work to be cleaned through the ultrasonic stage and the following rinses.

Other applications in the active development stage are quenching and plating. Research has been done, but no extensive development work reported on degassing, grain refinement, nitriding and carburizing.—**Reported by P. A. Stalder for Carolinas Chapter.**

Cites Developments in Cold Finished Bars at Tri-City

Speaker: Al Hoffman
LaSalle Steel Co.

Al Hoffman, director of industrial problem analysis, LaSalle Steel Co., spoke at a meeting of the **Tri-City Chapter** on "New Developments in Cold Finished Bars".

He outlined the contribution that a large industrial corporation can make to industry under the American patent system. Development and research have greatly improved the quality of finished products. Increased design problems and more difficult applications have resulted in higher strength cold finished steels.

New processes, such as heavy draft in the rolling process followed by a subcritical temperature draw, and elevated temperature rolling procedures, have produced excellent properties.

Mr. Hoffman described the effect of small additions of lead, sulphur or copper on fast machining steels. He also stressed the importance of using the fastest machining steels possible for a given application in order to reduce manhours, machine time and over-all costs. According to the speaker, once a product is completely satisfactory, it tends to become obsolete.—**Reported by Eric Welander for Tri-City.**

Atlanta Tours Steel Works

A plant tour of the E. V. Camp Steel Works was recently taken by the members of the **Atlanta Chapter.** John Camp, general manager, in a brief introductory talk, gave the history of the company and described some of its present-day products. Following this, the group toured the pattern making, moldmaking, furnace and finishing operations of the foundry. An actual pouring demonstration concluded the tour.

IMPORTANT MEETINGS *for April*

Apr. 8-11—Society of Automotive Engineers: Aeronautic Meeting and Production Forum and Aircraft Engineering Display. Hotel Commodore, New York. (John A. C. Warner, Secretary, 485 Lexington Ave., New York 17)

Apr. 13-18—American Chemical Society: Annual Meeting. San Francisco. (Alden H. Emery, Executive Secretary, 1155 16th St., N.W., Washington 6, D. C.)

Apr. 14-16—American Institute of Mining, Metallurgical & Petroleum Engineers: Openhearth Steel and Blast Furnace, Coke Oven, and Raw Materials Conference. Statler Hotel, Cleveland. (Ernest Kirkendall, Secretary, 29 W. 39th St., New York 18)

Apr. 14-17—Design Engineering Show & Conference: International Amphitheatre, Chicago. (Clapp & Poliak Inc., 341 Madison Ave., New York 17)

Apr. 14-18—American Welding Society: Welding Show and Technical Meetings. Kiel Auditorium and Statler Hotel, St. Louis. (Fred L. Plummer, National Secretary, 33 W. 39th St., New York 18)

Apr. 20-24—Scientific Apparatus Makers Association: Annual Meeting. El Mirador Hotel, Palm Springs, Calif. (Kenneth Andersen, Executive Vice-President, 20 N. Wacker Dr., Room 3120, Chicago 6)

Apr. 21-23—Association of Iron & Steel Engineers: Spring Conference. Dinkler-Tutwiler Hotel, Birmingham, Ala. (T. E. Ess, Managing Director, 1010 Empire Bldg., Pittsburgh 22)

Apr. 21-23—Metal Powder Association: Annual Meeting and Exhibit. Sheraton Hotel, Philadelphia. (Kempton H. Roll, Secretary, 130 W. 42nd St., New York 36)

Apr. 22-24—American Society of Lubrication Engineers: Annual Meeting and Exhibit. Hotel Cleveland, Cleveland. (Calvert L. Willey, Administrative Secretary, 84 E. Randolph St., Chicago 1)

Apr. 27-May 1—Electrochemical Society Inc.: Spring Meeting. Statler Hotel, New York. (Henry B. Linford, Secretary, 1860 Broadway, New York 23)

Discusses Advances in Toolsteels at Cleveland

Speaker: S. G. Fletcher
Latrobe Steel Co.

Stewart G. Fletcher, vice-president, metallurgy, Latrobe Steel Co., spoke at a recent meeting of **Cleveland Chapter** on "Recent Advances in the Metallurgy of Toolsteels."

In recent years there have been few new compositions introduced. Most work has been in the modification and improvement of older basic compositions. One of these improvements has been the addition of sulphur (0.10 to 0.15%) to high-speed, high-carbon, high-chromium steels. The added sulphur provides easier machinability and better finish, and, in some cases, actually improves the cutting performance of the finished tool. No instances of poorer cutting performance with sulphur-added high speed have been found. Impact strength is not lowered appreciably with higher sulphur.

Added sulphur has also been tried in the hot work die steels, but low carbon and vanadium do not allow the sulphur to precipitate as a eutectic, and the particle size tends to be large and difficult to control. Consequently, hot working problems are often encountered.

There has also been a general over-all increase in the use of vanadium as an alloying element in tool steels. Vanadium improves the cutting properties of high-speed, and the abrasion resistance of high-carbon high-chromium steels. For example, a 4% vanadium addition to standard high-carbon high-chromium steel increases the abrasion resistance approximately three times, due to the extremely high hardness of the vanadium carbides formed.

Improvements in heat treatment have also been made due to better equipment. Because of greater uniformity in chemistry and annealing treatment, it is now possible to predict the size change in a given part during hardening, and to have this size change remain constant from heat to heat.

Finally there have been improvements made in melting, casting, rolling and inspection practices which have resulted in a much more uniform and better product for the ultimate user.—**Reported by J. R. Shepard for Cleveland.**

Ohio Chapters to Meet

The Northeastern Ohio A.S.M. Regional Meeting will be held in Cleveland on Thursday, May 8, 1958. The theme will be "Aircraft and Guided Missile Alloys". Complete program will be printed in next month's *Metals Review*. Participating chapters are Cleveland, Akron, Mahoning Valley, Canton-Massillon and Warren.

Precision Casting Is Minnesota Topic

"Precision Investment Castings" Was the Subject of a Talk Given by F. S. Badger, Jr. (Right), Haynes Stellite Co., at a Meeting Held by Minnesota Chapter. He is shown with Norman Silvers, chairman of the Chapter

Speaker: F. S. Badger, Jr.
Haynes Stellite Co.

"Precision Investment Castings" was the subject of the talk given by F. Sidney Badger, Jr., vice-president and chief metallurgist, Haynes Stellite Co., at the annual joint meeting of the **Minnesota Chapters** A.S.M. and A.F.S.

Mr. Badger stated that the industrial beginning of the lost wax process began with the production of turbo supercharger impeller blades in 1941. He mentioned that investment castings will have extensive use in the rapidly expanding metal fields dealing with abrasion, corrosion and heat resistance.

Present applications for investment castings include: metal pieces requiring difficult-to-machine alloys; metal pieces having intricate or "costly to machine" shapes; metal pieces requiring clean, smooth, contoured surfaces (60 to 120 micro-in.); improved design through combining several pieces into one (integral castings); and castings requiring close "as-cast" dimensional tolerances.

The remainder of the talk dealt with factors to be considered to create practical investment casting designs. Mr. Badger emphasized the importance of consulting with the foundry engineers before a casting design is frozen.—**Reported by Paul B. Wallace for Minnesota Chapter.**

New Haven Hears Talk on Aluminum

Members of the New Haven Chapter Heard M. J. Pryor, Chief Chemical and Physical Section, Aluminum Technical Center, Olin Mathieson Chemical Corp., Give a Talk on "New Uses of Aluminum and Design for Maximum Corrosion Resistance" at a Recent Meeting. Shown are, from left: Harold O. Seeley, chairman; Dr. Pryor; and Elmer S. Barnes, technical chairman

Defines Brittle Fracture of Metals

Shown at a Meeting Held by the Montreal Chapter Are, From Left: G. M. Young, National President A.S.M. and a Member of the Chapter; W. S. Pellini, U. S. Naval Research Laboratory, Who Spoke on "Brittle Fracture in Metals"; and R. Thompson, Vice-Chairman of the Montreal Chapter

Speaker: W. S. Pellini

U. S. Naval Research Laboratory

W. S. Pellini, superintendent of the metallurgy division, United States Naval Research Laboratory, spoke on "Brittle Fracture in Metals" at a meeting of **Montreal Chapter.**

Mr. Pellini described cases of sudden catastropic failures of large welded steel structures such as ships, storage tanks and pressure vessels. Indications of the seriousness of this problem were first evident in the collapse of welded bridges in Belgium during the late 1930's and the collapse of large storage tanks in this country. During the early years of World War II, a high failure rate of the new all-welded merchant ships was experienced. The seriousness of the situation demanded an all-out effort by designers, welding engineers and metallurgists to determine the cause and to establish solutions or remedial procedures.

The speaker provided a chronological account of developments from 1942 to present. The mid-40's was a period marked by investigations of the Charpy-V characteristics of failure material which may be described as the search for a correlation between small laboratory notch tests and service experience. This work was fruitful and demonstrated that brittle fractures were initiated only at temperatures such that the Charpy-V tests indicated values of less than 10 ft-lb. Since this time it has been established by work at the Naval Research Laboratory and further correlations with service failures that all steels do not obey the 10 ft-lb rule. For certain classes of steels the critical correlation values are in the order of 15 to 30 ft-lb.

Another approach was to test large pieces of steel containing notches of various types to reproduce the failure conditions at the temperatures of failures in service. This approach was not friutful until very sharp cracks were placed in the test plates. Work with brittle weld crack starting tests established the existence of a critical temperature, termed the nil-ductility temperature, below which the steel could be described as unable to deform in the presence of a sharp crack. This temperature was shown to be in correct correspondence with the failure temperatures of the ship steels and a wide variety of nonship failures, such as pressure vessels. The sharp crack approach was further exploited successfully in the Robertson test (England) and in the S.O.D. test (United States). These tests were successful in predicting crack stopping temperatures; that is, temperatures above which the fractures could not propagate in material stressed within the elastic range.

Mr. Pellini explained that the results of these investigations have been fitted into a general scheme which defines the role of design, welding and materials in the problem of brittle fracture. Temperature, as a new parameter of design, must be recognized as basic to this problem. The lesson of the wartime ships—that a design which is safe for operation of the ship at summer temperatures may be unsafe for winter temperature operation—must be accepted as a guide in the future, if the steels show a notch ductile-to-notch brittle transition in this temperature range. The designer should thus be concerned with questions of the notch ductile-to-notch brittle transition characteristics of steels as related to the expected service temperature range.

The role of the metallurgist is now clear; the properties of the steels must be modified (within certain restrictions of economics) so that the notch ductile-to-notch brittle transition is below that of the expected service temperature. If the metallurgist succeeds, the designer's task is greatly simplified; conventional design concepts may be applied with safety. If steels of adequate notch ductility are not available, great attention to design details is mandatory in order to lower the *probability* of failure to acceptable levels. The significance of the ductile to brittle transition temperature range is that above this range the probability of brittle fracture is removed, while below this range the probability is always finite. That is to say, below the transition temperature, design aspects serve only to alter the probability of failure.

The role of welding is now clear also, although less definable than in the case of metallurgy. Welding may contribute notches, cracks or other flaws from a variety of causes. The presence of such notches or flaws at points of high stresses in steel of inadequate notch ductility is the combination which leads to the "brittle fracture problem".—**Reported by G. F. Norman for Montreal.**

Rockford Members Tour Steel Plant

Members and Guests of the Rockford Chapter Recently Toured the Steel Mill of the Northwestern Steel & Wire Co. The tour was preceded by a talk by Mr. Farnham, vice-president of industrial relations, in which he outlined the growth and history of the company since 1879. Vice-chairman Quentin Bowen, Jr., third from left, introduced the speaker and members of the Northwestern Steel & Wire Co. who were at the dinner meeting

CHAPTER MEETING CALENDAR

Akron	**Apr. 16**	Sanginiti's		Atomic Power
Albuquerque	**Apr. 17**	La Placita	**J. D. Graham**	Field Failures as Influenced by Heat Treatment and Machining
Baltimore	**Apr. 21**	Engineering Club	**Jack Wambold**	Cermets for Aircraft and Commercial
Birmingham	**Apr. 1**	American Cast Iron Pipe Co.		Plant Visit Applications
Boston	**Apr. 11**	M.I.T. Faculty Club		Sauveur Night
British Columbia	**Apr. 9**	Stanley Park Tea Room		Service Failures
Calumet	**Apr. 8**	Phil Smidt's	**R. K. Burns**	Industrial Relations
Canton-Massillon	**Apr. 1**	Mergis Restaurant	**Panel**	Corrosion
Cedar Rapids	**Apr. 8**	Roosevelt Hotel	**Panel**	Arranged by Educational Committee
Chicago	**Apr. 14**	Furniture Club	**R. L. Wilson and Joseph Casey**	Progress in Engineering Alloy Steels; Electronic Pyrometers
Cincinnati	**Apr. 10**	Engineering Society	**W. M. Baldwin, Jr.**	Why Metals Bust
Cleveland	**Apr. 7**	Hotel Manger	**D. N. Frey**	Materials Problems in Automobile Engines of Tomorrow
Delaware Valley	**Apr. 16**		**H. J. Godfrey**	Prestress Concrete Wire
Detroit	**Apr. 14**		**W. H. Steurer**	Guided Missiles
Edmonton	**Apr. 17**	Canadian Chemical Co.		Plant Visit
Fort Wayne	**Apr. 14**	Hobby Ranch House	**D. J. McPherson**	Physical Metallurgy of Titanium
Hartford	**Apr. 8**	Indian Hill Club	**John Fry**	Nuclear Power
Indianapolis	**Apr. 21**	Village Inn	**J. T. Burwell, Jr.**	Surface Friction and Wear
Kansas City	**Apr. 16**	M.C.I. Airport	**Tour**	Overhaul Base-TWA
Lehigh Valley	**Apr. 4**	Hotel Traylor	**G. M. Young**	Annual Students Night
Long Island	**Apr. 23**	Patricia Murphy's	**M. C. Leverett**	Aircraft Nuclear Propulsion
Los Angeles	**Apr. 24**	Rodger Young Audit.	**William Jones**	What's New With Metals in the Electronic Industry
Milwaukee	**Apr. 15**	City Club	**W. L. Grube**	Electron Metallography
Minnesota	**Apr. 23**	Calhoun Beach Hotel	**J. H. Hollomon**	New Horizons in Metallurgy
Montreal	**Apr. 7**	Queen's Hotel	**E. E. Lull**	Metal Worker's Omnibus
Muncie	**Apr. 8**	Ball State Student Center		Student Night
New Haven	**Apr. 17**	Waverly Inn	**A. Bornemann**	Failure Analysis of Metals
New Jersey	**Apr. 21**	Essex House	**W. C. Schulte**	Fatigue Studies of Carburized and Nitrided Steels
New Orleans	**Apr. 2**	Lenfant's		Casting of Nonferrous Metals
New York	**Apr. 7**	Brass Rail	**F. Lenel**	New Techniques in Powder Metallurgy
North Texas	**Apr. 4**		**G. K. Teal**	Germanium-Silicon and Their Applications
NE Pennsylvania	**Apr. 10**	Irem Temple Country Club	**W. Steurer**	Guided Missiles
Ontario	**Apr. 11**	Beacon Motel, Jordan Harbour	**L. M. Pidgeon**	Something About Metals and Alloys
Ottawa Valley	**Apr. 8**	Mines Branch	**H. M. Banta**	Design and Construction of Gas Transmission Pipelines
Peoria	**Apr. 14**	American Legion	**J. J. Chyle**	Metallurgical Aspects of Welding
Philadelphia	**Apr. 25**	Engineers Club	**J. F. Victory**	Aeronautical Scientific Progress
Jr. Section	**Apr. 7**	Engineers Club	**W. F. Eberly**	Toolsteels
Pittsburgh	**Apr. 10**	Gateway Plaza	**M. F. Judkins and H. D. Kessler**	High-Temperature Materials; Titanium
Rhode Island	**Apr. 2**	Johnson's Hummock Grill	**C. Herrmann**	Opportunities for Industrial Diversification
Rochester	**Apr. 14**	Howard Johnson's	**W. E. Jones**	Vacuum Melting
Rockford	**Apr. 23**	Faust Hotel	**W. Bruckart**	Arc-Cast Molybdenum
Rome	**Apr. 7**	Trinkus Manor	**J. D. Lubahn**	Brittle Fracture
Saginaw Valley	**Apr. 8**	High Life Inn	**J. D. Graham**	Selection of Engineering Materials
St. Louis	**Apr. 18**	Stratford Hotel	**Panel**	Stump the Experts
Savannah River	**Apr. 10**	Timmerman's	**J. C. Redmond**	Cermets
Springfield	**Apr. 21**	The Gables	**D. S. Gormly**	A User Looks at High-Speed Steel
Syracuse	**Apr. 1**	Onondaga Hotel	**C. Johnson**	Automation in the Laboratory
Texas	**Apr. 1**	Ben Milam Hotel	**W. Holcroft**	Furnace Atmospheres
Tri-City	**Apr. 8**	American Legion	**V. E. Lysaght**	Hardness Testing of Metals
Utah	**Apr. 00**		**R. Thoreson**	Labor Relations
Washington	**Apr. 14**	American Assoc. of University Women	**N. J. Grant**	Fine Particle Strengthening
West Michigan	**Apr. 21**	A.C. Spark Plug Division	**Tour**	Plant Tour-General Motors Corp.
Wichita	**Apr. 8**	K of C Hall	**A. Goldblatt**	Spectrographic Analysis
Wilmington	**Apr. 9**	Powder Mill	**M. G. Fontana**	Unusual Corrosion Problems
Worcester	**Apr. 9**	Hickory House	**T. B. Taylor**	Modern Free Machining Steels
York	**Apr. 9**	Gettysburg	**Hans Conrad**	New Concepts in Creep

Apr. 9—TRI-CHAPTER MEETING
Cincinnati-Columbus-Dayton
Armco Steel Co., Middletown, Ohio

Classes at Los Angeles Near Finish

The Metals Engineering Institute's Largest Single Group of Students Are Approaching Completion of Course I, Elements of Metallurgy. Under sponsorship of the Los Angeles Chapter and supervision of E. T. Bergquist, education committee chairman, they are being instructed by C. H. Dickson, metallurgist, Alloy Fabricators. When the course was announced, applications were so high that 96 registrants had to be divided into smaller classes for closer student-instructor relationship. The program has been accelerated to complete the 15-lesson course in four months. A smaller group at Cleveland Pneumatic Tool Co., Cleveland, proceeded at a more leisurely pace and finished the course in 7½ months

Compliments

To C. H. MATHEWSON, professor emeritus of metallurgy and metallography at Yale University, on being elected to Honorary Membership by the A.I.M.E.

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To WILLIAM J. HARRIS, JR., on his appointment as executive director of the Materials Advisory Board of the National Academy of Sciences, Division of Engineering and Industrial Research.

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To AUGUSTUS B. KINZEL, vice-president of the Union Carbide Corp., on his selection as president of A.I.M.E. for a one-year term.

♦ ♦ ♦

To RALPH A. CLARK, manager of foundry service, Electro Metallurgical Co., who will receive the Thomas W. Pangborn Gold Medal of the American Foundrymen's Society at the Castings Congress and Foundry Show to be held in May; to HOWARD J. ROWE, chief metallurgist, Castings Division, Aluminum Co. of America, who will receive the William H. McFadden Gold Medal of A.F.S.; and to KENNETH H. PRIESTLEY, president, Vassar Electroloy Products, Inc., FRANKLIN B. ROTE, technical director, Albion Malleable Iron Co., FRANK S. BREWSTER, director of research and development, Brumley-Donaldson Co., and FRED G. SEFING, metallurgist, Development and Research Division, International Nickel Co. Inc., who will receive Awards of Scientific Merit.

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To F. N. DARMARA, general manager of Utica Metals Division of the Kelsey-Hayes Co., who has been named to the subcommittee on power plant materials of the National Advisory Committee for Aeronautics for 1958.

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To FRANZ P. ZIMMERLI, director of research for Associated Spring Corp., on his retirement. He received A.S.M.'s Albert Sauveur Award in 1947 for his work in demonstrating that favorable stresses could be given to the surface layer of metal parts by shot peening.

♦ ♦ ♦

To H. EARL MCKIMMEY, foundry superintendent at U. S. Steel Co.'s roll and machine works, who has retired after 45 years service with the company.

♦ ♦ ♦

To ALEXANDER SQUIRE, who has been awarded the Westinghouse Order of Merit for his outstanding work in the building of America's first fleet-type nuclear submarine, the USS Skate. Mr. Squire was cited for "his technical leadership and management ability in the development of the nuclear propulsion plant for fleet-type submarines, for his guidance of reactor development at the Naval Reactor Facility, and for his technical contributions in materials and metallurgy to Westinghouse atomic projects".

New Films

Industrial Management Society

More than 70 films describing American work simplification and industrial engineering techniques are included in the 1958 edition of the Industrial Management Society film rental catalog. The films, many of them in color and sound, have all been produced by leading American companies. Copies of the catalog are available from: Industrial Management Society, 330 South Wells St., Chicago 6, Ill.

High Production Press Maintenance

A 16-mm. color and sound film which describes the proper maintenance procedures for high-speed presses, including lubrication, adjusting and checking of clearances, can be obtained by contacting E. W. Bliss Co., Canton, Ohio, or local Bliss representatives.

Industrial Compressors for Tomorrow

An axial flow compressor, designed by Carrier Corp. for a vital role in the age of jets, rockets and atomic energy, is the star of a motion picture produced by Sam Orleans and Associates, Inc. The film shows, in color and with narration, the compressor's mechanical principle of blades rotating at close tolerances between stationary blades to move gases in tremendous volume and under pressure. Prints may be borrowed from the Carrier Corp., Syracuse, N. Y.

Pure and Simple

Practical solutions to the problems of industrial waste and water conservation are detailed in the picture just released by Link-Belt Co. The film highlights ways in which industry can conserve water by combatting pollution, salvaging valuable byproducts, recirculating water and treating sewage wastes. It is available on letterhead request from: Public Relations Dept., Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

Resistance Welding

The Resistance Welder Manufacturers' Association has produced a 23-min. sound and color film which follows in logical sequence the General Electric Co.'s film entitled "This Is Resistance Welding". The sequel and the G.E. film can both be obtained through R.W.M.A., 1900 Arch St., Philadelphia 3, Pa.

MEN OF METAL

THEODORE H. BOOTH has been elected president of the Frontier Bronze Corp., Niagara Falls, N. Y., to succeed the retiring president, ERNEST H. HOLZWORTH.

SEWARD ABBOTT, for many years with Servel, Inc., is now on the Washington staff of the American Gas Association as utilization engineer, a position created to provide information and advisory services for Federal departments and bureaus.

L. C. BEGG, formerly manager at Buffalo, N. Y., will head the new European Information Center which Ampco Metal, Inc., has established in Paris, France. He will be in charge of coordinating manufacturing with sales efforts and will provide technical information to users and sellers on the continent.

LAWRENCE ALLISON, of Dallas, Tex., has joined the staff of the Cyril Bath Co., Solon, Ohio. He is a specialist in manufacturing methods of high-speed aircraft and guided missiles, and, in the capacity of sales engineer, will be responsible for all phases of the company's operations.

Three promotions in the Alloy Tube Division have been announced by Carpenter Steel Co. FRED R. CHIPPIGA is now assistant to the manager of promotion and market analysis, ROBERT W. FAUSE is sales office manager, and WILLIAM VATH becomes assistant to the divisional controller.

KENNETH C. ALLEN, formerly senior research analyst, Commercial Research Division, Jones & Laughlin Steel Corp., has been promoted to supervisor of research and analysis of the division.

WILLIAM W. GILBERT is now manager of the Detroit district sales office of Babcock & Wilcox Co.'s boiler division. He succeeds ARTHUR R. WAUGAMAN, who is retiring after 22 years of service.

WALTER J. BERNARDY has been appointed assistant branch manager at the Cleveland sales office of Crucible Steel Co. of America. DOUGLAS W. STURGES has been named assistant branch manager.

FRANK F. APLAN has joined the technical staff of the Metals Research Laboratories, Electro Metallurgical Co. He will explore new techniques of ore beneficiation of calcium carbide, ferro-alloys, titanium and other metals.

ALFRED A. PAUL has been appointed general manager of engineering sales for Brooks Oil Co., Cleveland.

EDWARD J. O'ROURKE has been appointed Norelco sales engineer, Mount Vernon branch office, by the Instruments Division, Philips Electronics, Inc., and will assist in handling customer problems in the branch area.

JOHN W. MCCUE, formerly abrasive engineer in the Chicago area, has been appointed field engineer at the Indianapolis district office of Norton Co.

RAYMOND C. MCCULLOUGH has been appointed sales manager for Abrasive Dressing Tool Co., Detroit. He was formerly with Bohn Aluminum and Brass Corp.

JAMES M. MATTHEWS, who has been product manager, silicon electric steel sales, is now director of sales, magnetic and electronic materials, Allegheny Ludlum Steel Corp.

WILLIAM F. PRAVEL is now supervisor of toolsteel development in the application and development department of Allegheny Ludlum Steel Corp.

Gives Talk on Electron Microscopy

William L. Grube (Center), General Motors Research Staff, Who Spoke on "Electron Microscopy" at a Meeting Held Recently by the Dayton Chapter Is Shown With Walter J. Ridd (Left,) Vice-Chairman; and George Rappaport, Chairman of the Southeastern Chapter of the Optical Society of America

Speaker: William L. Grube
General Motors Corp.

In order to use the electron microscope effectively in metallurgical studies, the specimen must first be prepared properly, it must be replicated faithfully, and the resulting micrographs must be interpreted correctly. This statement was made by W. L. Grube of the General Motors Research Staff at a joint meeting of the **Dayton Chapter** and the local chapter of the Optical Society of America.

The electron microscope, now a valuable aid to the metallurgist, was once viewed with distrust. This doubt resulted from the complexity of the several steps involved in electron metallography but was chiefly due to the fact that metal specimens could not, at that time, be viewed directly. Since the electron beam in the conventional electron microscope must pass through the specimen, and since suitable sectioning techniques had not yet been developed for preparing thin metal specimens, it was (and still is to a great extent) necessary to use a replica of the surface to be examined. However, through a better understanding of the limitations of each of the various procedural steps and concurrent advancements in technique, electron metallography has reached its present high state of usefulness and is being widely used in current metallurgical research. Typical of the studies being conducted are: precipitation of carbides during the early stages of the tempering of steel; decomposition of austenite; and age hardening in heat-resistant alloys. The utility of "extraction replicas" in these studies was also emphasized.

For the future, the recently developed carbon replica holds great promise, and, an ever increasing number of metals are being prepared successfully in thin sections so that they may be examined directly in the modern high-voltage electron microscopes. In addition, two other types of microscope, the thermionic electron-emission and the field ion-emission, have been further developed. The thermionic emission type can be used to study solid state transformations at high temperatures and the field ion-emission type used to obtain exceedingly high magnifications. For example, a micrograph of a single crystal tungsten point was shown that had been obtained by Muller at a magnification of five million diameters.—**Reported by Joseph J. Warga for Dayton.**

A.S.M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Inustrial Journals and Books Here and Abroad Received During the Past Month

Prepared at the Center for Documentation and Communication Research, Western Reserve University, Cleveland, With the Cooperation of the John Crerar Library, Chicago.

Annotations carrying the designation (CMA) following the reference are published also in *Crerar Metals Abstracts*.

A General Metallurgy

97-A. Methods of Combatting Air Pollution in Ferrous and Non-Ferrous Foundries. Herbert J. Weber. *Air Pollution Control, Journal,* v. 7, Nov. 1957, p. 178-181.
(A8a)

98-A. A History Lesson on Nineteenth Century Metallurgical Industry. R. Chadwick. *Birmingham Metallurgical Society, Journal,* v. 37, Dec. 1957, p. 566-595.
(A2)

99-A. Republic Steel Corporation Expands Cleveland Plant to 3,360,000 Tons Capacity. *Blast Furnace and Steel Plant,* v. 46, Jan. 1958, p. 60-62.

By addition of two new 375-ton openhearth steelmaking furnaces and expansion of four other openhearths. (A4p, D2; ST)

100-A. Automotive Gray Cast Iron. Pt. 2. D. L. Watson. *Canadian Metalworking,* v. 20, Dec. 1957, p. 42-46.

Rate of transformation and ideal composition.
(A general, T21, 2-60; CI)

101-A. Liquid Metals Technology. Pt. 1. *Chemical Engineering Progress Symposium Series,* v. 53, no. 20, 1957, 84 p. (Published by American Institute of Chemical Engineers.)

Articles abstracted separately.
(A general, 14-60)

102-A.* Manufacture and Availability of the Alkali Metals. Marshall Sittig. Paper from "Liquid Metals Technology", Pt. 1. Chemical Engineering Progress Symposium Series, p. 35-41.

Review of manufacturing processes for various alkaline metals and brief historical notes. Raw materials situation with regard to geographic location, ore processing, present manufacturing facilities in various countries of the world; future possibilities. 25 ref.
(A11a, A general; EG-e, 14-60)

103-A. A Century and a Half of Sodium Development. M. Schofield. *Chemical Products and Chemical News,* v. 20, Dec. 1957, p. 503-504.

Isolation of Na in 1807; development of manufacture; some current uses. (A general; Na)

104-A.* Developments in the Iron and Steel Industry During 1957. I. E. Madsen. *Iron and Steel Engineer,* v. 35, Jan. 1958, p. 139-185; 188-189.

Detailed analysis of production statistics; future trends, announced expansion plans for both American and foreign plants; raw materials; survey of new blast furnace, steelmaking, rolling and finishing techniques; furnaces and methods of control; mechanical and electrical innovations. (A4, D general, F23; ST)

105-A. Republic's Expansion Program Nears Completion. *Iron and Steel Engineer,* v. 35, Jan. 1958, p. 196-199.

Program will increase the annual ingot capacity of the Cleveland plant by 788,000 tons to 3,360,000 tons.
(A4p, D general; ST)

106-A. Fundamentals of Scale Model Experiments. W. O. Philbrook. *Journal of Metals,* v. 9, Oct. 1957, p. 1353-1358.

Problems and limitations in modeling and results obtainable from pilot-plant studies of complex metallurgical processes with application to heat transfer of solid patricles, fluid flow models, gasification of fuels, shaft, reverberatory and arc furnaces. 12 ref.
(A9j, A11e, D general)

107-A.* Design of Pyrometallurgical Pilot Plant. R. C. Buehl. *Journal of Metals,* v. 9, Oct. 1957, p. 1359-1362.

Design of scale pilot plants for study of entire processes. Pilot plant of electric arc, melting furnaces, blast furnaces, openhearth furnaces and converters are considered. (A9j, W17, W18, D general)

108-A. European Metallurgical Research—Fundamental to the Coal and Steel Community. F. Weston Starratt. *Journal of Metals,* v. 9, Oct. 1957, p. 1365-1366.

Report on metallurgical research program supported by authority of European Coal and Steel Community. (A9; ST)

109-A. Blast Furnace U. S. A. Pt. 3. From Falling Creek to Zug Island. M. O. Holowaty and C. M. Squarcy. *Journal of Metals,* v. 9, Oct. 1957, p. 1367-1372.

Historical account of conversion of furnaces from charcoal to bituminous and finally to coke. The expansion of the American iron and steel industry during the 19th and 20th centuries; evolution in furnace dimensions. 38 ref. (A2, D1)

The subject coding at the end of the annotations refers to the revised edition of the ASM-SLA Metallurgical Literature Classification. The revision is currently being completed by the A.S.M. Committee on Literature Classification, and will be published in full within the next few months.

110-A. "Araldite" and the Light Metals. P. A. Dunn. *Light Metals,* v. 20, Dec. 1957, p. 389-394.

Various applications of epoxy resins for coatings, adhesive and filler on light metals. Epoxy resin also used for tooling material.
(A general, K12, L26p, 17-57; NM-d)

111-A. French Aluminum Industry. Georges A. Baudart. *Metal Progress,* v. 73, Jan. 1958, p. 72-75.

The lead taken by France's pioneering scientists in Al technology has been maintained by their successors. Recent changes in cell design and operations have decreased power requirements by 27%, and man-hours by 66%.
(A4p, C23, F23; Al)

112-A. Progress of Metallurgy in Europe. Hubert Sutton. *Metal Progress,* v. 73, Jan. 1958, p. 102-104.

Metallurgical education in England is steadily expanding, although free and rapid interchange of information leaves something to be desired. Pressing problems in Europe as in America have to do with brittle behavior of metals, resistance to hot corrosive surroundings and damage by thermal or stress cycling.
(A9, A3)

113-A. Iron and Steel Needs of Argentina. Juan B. De Nardo. *Metal Progress,* v. 73, Jan. 1958, p. 109-111.

In the late 1920's Argentina produced only 10% of its needed iron and steel; now it makes 30%. Future deficits will be reduced when the San Nicolas steel mill starts production. Annual needs for 1,200,000 metric tons are predicted during the 1960 decade.
(A4p, D general; ST)

114-A. Heat Resistant Alloys. *Metalworking,* v. 8, Oct. 1957, p. 107-109.

Tabular data on heat resistant alloys giving typical composition and heat treating recommendations for a wide variety of stainless steels, Ni-base, Cr-base and Co-base alloys.
(A general, J general; SGA-h)

115-A. Putting Honeycomb Scrap to Work. Jack Lewis. *Tool Engineer,* v. 34, Dec. 1957, p. 91-92.
(A11d; Al, 7-59, RM-p)

116-A. Engineering Properties of Pattern Waxes. Charles J. Marsel, Leonard Kramer and Alexander Saunders. *Tool Engineer,* v. 39, Nov. 1957, p. 95-98.

Tests performed on six commercial

waxes relating temperature to volume change, hardness and viscosity; tensile strength and cooling; curves tabulated.
(A general, E15; NM-d32)

117-A. **Titanium, a Materials Survey.** Jesse A. Miller. *U. S. Bureau of Mines, Introduction Circular* 7791, Sept. 1957, 202 p.

Titanium and rutile as strategic materials. (A general, A11; Ti)

118-A. **Stainless Steel and Titanium Sandwich Structures.** W. J. Lewis, G. E. Faulkner and P. J. Rieppel. Battelle Memorial Institute. *U. S. Office of Technical Services*, PB 121633, Aug. 1957, 39 p. $1.

Summary of published literature and government research reports.
(A general, T24a, 7-59; Al, SS)

119-A. (Finnish.) **Recent Developments of the Steel Industry at Home and Abroad.** L. Pietikainen. *Teknillisen Kemian Aikakauslehti*, v. 14, June 1957, p. 213-215.

Mechanical properties of mass production steel and the international quality requirements; new methods and the use of automation; estimates for the future; progress in the Finnish steel industry.
(A general; ST)

120-A. (French.) **French-English and English-French Glossary of Machine Tool Terms.** Pierre Nichil. *La Machine Moderne*, v. 51, Nov. 1957, p. 95-96.

(A general, G17; 11-67)

121-A. (German and French.) **History of Arc-Welding Electrodes.** F. Wortmann. *Zeitschrift für Schweisstechnik*, v. 47, Oct. 1957, p. 242-247.

Carbon electrodes, metallic electrodes and automatic welding; use of fluxes, lime and coated electrodes. (A2, W29h)

122-A. (German.) **Hard Metals.** C. Agte and R. Kohlermann. *Die Technik*, v. 12, Oct. 1957, p. 686-689.

New materials and carbides suitable for finishing steel. 9 ref.
(A general, T6n; SGA-j; Ti, W, 6-69)

123-A. (German.) **Forecasting of Production and Profit in Foundries.** Walter Fuhrman. *Giessereitechnik*, v. 3, Oct. 1957, p. 225-228.

(A5, E general)

124-A. (German.) **Ceramics for High Temperatures.** Walter Richter. *Silikat-Technik*, v. 8, Sept. 1957, p. 387-389.

Tests on alumina-chromium and alumina-molybdenum cermets. 5 ref.
(A general, 6-70; SGA-h)

125-A. (German.) **Réaumur and Discovery of Malleable Iron.** H. Abrecht. *Schweizerische Bauzeitung*, v. 75, Oct. 12, 1957, p. 651-653.
(A2, E general; CI-s)

126-A. (German.) **New Materials and Testing Services. Metallic Materials.** Karl Wellinger. *VDI Zeitschrift*, v. 99, Sept. 21, 1957, p. 1343-1346.

Survey of recent technological developments. 92 ref. (A general)

127-A. (Italian.) **Ancient Tuscan Metallurgy: The Follonica Foundry and the Lorena Family.** Bruno Boni. *Fonderia Italiana*, v. 6, Nov. 1957, p. 421-430.

Installations, products, economic role, 1737-1845, under Lorena family, who replaced Medicis in Grand Duchy of Tuscany. 10 ref. (A2)

128-A. (Russian.) **Production of Steel in the U. S. S. R.** D. A. Smolyarenko. *Stal'*, v. 17, Nov. 1957, p. 968-976.
(A4; ST)

129-A. (Russian.) **Research in the Field of New Steels, Alloys, Metallography and Heat Treatment.** M. V. Pridantsev. *Stal'*, v. 17, Nov. 1957, p. 1006-1010.

Progress made in developing new steels and alloys to meet the growing demands of the Soviet industry.
(A9, M general, J general; ST)

130-A. (Russian.) **Development of the Iron and Steel Industry of Hungary.** Gertzeg Ferentz. *Stal'*, v. 17, Nov. 1957, p. 1032-1033.
(A general; ST)

131-A. (Russian.) **Development of the Metallurgical Industry in East Germany.** Rudolf Shtainband. *Stal'*, v. 17, Nov. 1957, p. 1034-1038.
(A general)

132-A. (Russian.) **Iron and Steel Industry in Poland.** K. Zhemaitis. *Stal'*, v. 17, Nov. 1957, p. 1038-1041.
(A general; ST)

133-A. (Russian.) **Development of the Metallurgical Industry in Roumania.** Karel Lonchar. *Stal'*, v. 17, Nov. 1957, p. 1042-1045.
(A general)

134-A. (Russian.) **Condition and Perspective of Development in the Iron and Steel Industry of Czechoslovakia.** Vatslav Cherny. *Stal'*, v. 17, Nov. 1957, p. 1046-55.
(A general; ST)

135-A. (Czech.) **Control and Regulation of Metallurgical Production Quality.** Jaroslav Brynda. *Hutnické Listy*, v. 12, Nov. 1957, p. 1045-1049.

Improvement in Czechoslovakian metallurgy requires better final products inspection, better production processes and equipment and metallurgical - mathematical statistical analytical methods to uncover causes of defects. 7 ref.
(A5, S general)

136-A. (German.) **Investigation on an Iron Short Sword of Luristanic Origin.** Friedrich Karl Naumann. *Archiv für das Eisenhüttenwesen*, v. 28, Sept. 1957, p. 575-581.
(A2; Fe)

137-A. (German.) **The Age of Iron Production on the Banks of the Lower Sieg.** Josef Wilhelm Gilles. *Stahl und Eisen*, v. 77, Dec. 26, 1957, p. 1883-1884.
(A2; Fe)

138-A. (French.) **100th Anniversary of Cowper Stoves.** Louis Delville. *Metaux, Corrosion, Industries*, v. 32, Oct. 1957, p. 397-405.

Evolution of recuperators in general; role of Cowper stoves in development of steel manufacture. 6 ref. (A2, W17m; ST)

139-A. (French.) **Production of Aluminum in the Countries of Eastern Europe.** G. A. Baudart. *Revue de l'Aluminium*, v. 34, Dec. 1957, p. 1187-1189.

Before last war, the only East European countries producing Al were Russia and Hungary. Czechoslovakia now has plant which produced 24,000 tons in 1955, and expects to increase capacity to 56,000 tons by 1960. Poland, Roumania, and Bulgaria have also entered field.
(A4p; Al)

140-A. **Research and the Nickel Industry.** R. D. Parker. *Canadian Mining and Metallurgical Bulletin*, v. 50, Nov. 1957, p. 659-664. (Also *Transactions*, v. 60, 1957, p. 357-362.)
(A2, A9m; Ni)

141-A. **Cost Accounting Procedures for the Gray Iron Foundry.** Albert E. Grover. *Foundry*, v. 86, Feb. 1957, p. 89-91.
(A4s, E general; CI-n)

142-A. **Metallurgical Summary of 1957.** W. H. Eisenman. *Industrial Heating*, v. 25, Jan. 1958, p. 40-42.

Search for metals with increased strength, corrosion resistance and superior qualities at 1200 to 2000° F.; development of alloys for specific purposes; production of such metals as Cb, Ta and Zr in ductile form for nuclear applications; research in direct reduction of iron; usable foamed Al; new techniques in powder metallurgy; new information about Pu. (A general; 10-54)

143-A. **Titanium-Sheet-Rolling Program.** N. E. Promisel and William J. Harris, Jr. *Mechanical Engineering*, v. 79, Dec. 1957, p. 1112-1115.

Program has as its objectives the development of production techniques for producing necessary reliability, strength and high-temperature characteristics and to obtain design and manufacturing data for new Ti sheet alloys.

(A general, F23q; Ti, 4-53)

144-A. **Science for Electroplaters. Pt. 33. Cyanide Waste Treatment—Ozonation and Electrolysis.** L. Serota. *Metal Finishing*, v. 56, Feb. 1958, p. 71-74.

(A8b, L17)

145-A. **Wrought Titanium.** J. R. Crane. *Metal Industry*, v. 91, Nov. 29, 1957, p. 445-458, 464.

(A general, 4-53; Ti)

146-A. **Metallurgical Research and Education. (Continued.)** G. P. Chatterjee. *Science and Engineering*, v. 10, Sept. 1957, p. 41-56.

Ionic theory of slag; ionic nature of molten alloys; development of new alloys; establishment of alloy steel and ferro-alloy plants in India; surface phenomena and diffusion; imperfections in crystals, dislocations; stress and strain in metals and alloys; nuclear metallurgy; fundamentals of metallurgical and engineering education. 85 ref. (A9, A3)

147-A. **Ferrous Castings Stretch Your Dollars.** *Steel*, v. 142, Jan. 13, 1958, p. 70-74.

Mechanical properties and advantageous factors governing proper selection of various irons. New uses stimulated by advanced metallurgy.
(A general, Q general, 17-57; CI)

148-A.* **Tantalum.** F. G. Cox. *Welding and Metal Fabrication*, v. 25, Nov. 1957, p. 416-422.

Physical, mechanical and corrosion resistant properties; rolling, drawing, spinning, machining and welding characteristics. (A general; Ta)

149-A. (French.) **American Research on Boron Steels.** A. Roos. *Metallurgie et la Construction Mecanique*, v. 89, Dec. 1957, p. 1015-1019.

(A9; ST, *B*)

150-A. (Norwegian.) **Place of Norway in the Aluminum Industry of the World.** Aage W. Owe. *Tidsskrift for Kjemi, Bergvesen og Metallurgi*, v. 17, no. 8, 1957, p. 121-124.

Development of the Norwegian Al industry. Further investments are recommended on the basis of increasing demands and on the favorable position of Norway due to cheap electric power. (A4; Al)

151-A. (Russian.) **Foundry Production in Leningrad.** N. G. Girshovich and Yu. A. Nekhandzi. *Liteinoe Proizvodstvo*, Oct. 1957, p. 6-13.

Historical survey of production of cast iron, steel and nonferrous castings in Leningrad in past 40 years.
(A2, E general)

152-A. (Pamphlet.) **Materials Survey—Aluminum. Business and Defense Services Administration.** 100 p. Nov. 1956. U. S. Government Printing Office. Washington 25, D. C. $2.50.

Aluminum and the Al industry in national defense.
(A general, 17-57; Al)

Ore and Raw Material Preparation

36-B. Production of Blast Furnace Coke at High Coking Rate. Emmett A. Brady. *Blast Furnace and Steel Plant,* v. 46, Jan. 1958, p. 54-59.

Raw materials, facilities and operating practice at Cleveland Coke and Coal Chemical Works, U. S. Steel Corp., Cleveland, Ohio. (B18n; RM-j43)

37-B. Sinter-Plant Assessment Trials at John Summers and Sons, Ltd., Shotton. H. Bates, G. C. Carter and D. F. Ball. *Iron and Steel Institute,* v. 188, Jan. 1958, p. 45-54.

Leakage of air between the strand and the fan was measured. Performance of the sinter cooler. (B16a; Fe)

38-B. Paris Sintering Conference. A Summary. J. Astier. *Journal of Metals,* v. 9, Oct. 1957, p. 1363-1364.

Summarizes symposium on iron ore sintering with note on mechanism of sintering, sinter quality, plant operation and effect on blast furnace operation. (B16, D1a; Fe)

39-B.* Castable Refractories. A. E. Williams. *Metal Industry,* v. 92, Jan. 3, 1958, p. 3-7.

Properties and applications of aluminous cement; difference in composition from conventional cement bestows on the aluminous cement a normal setting time followed by rapid hardening, a high resistance to chemical attack and to elevated temperatures, which latter property makes it suitable for use as a bond for refractory aggregates, to withstand temperatures up to 1800° C. (B19; RM-h)

40-B. Ferromanganese From Lean Ore. B. R. Nijhawan. *Metal Progress,* v. 73, Jan. 1958, p. 112-116.

India has exported about 1,000,000 tons of hand-picked high-grade manganese ore annually, but its large resources in low-grade ore could, when concentrated and smelted, be sold as standard ferromanganese and the value doubled. Numerous projects of this sort are in pilot plant or small production. (B14, C21, 2-60; Fe, Mn, AD-n)

41-B. Manitoba Pushes Ahead on New Major Nickel Source. Henning Nielsen. *Mining Engineering,* v. 9, Dec. 1957, p. 1321-1323.

(B general, A11a; Ni)

42-B. Grinding Magnetic Taconite in Rod Mills. E. M. Furness and A. S. Henderson. *Mining Engineering,* v. 9, *Transactions AIME,* v. 209, Dec. 1957, p. 1359-1360.

(B13; Fe)

43-B. Agglomeration and Flotation of Manganese Ore. Ellis H. Gates. *Mining Engineering,* v. 9, *AIME Transactions,* v. 209, Dec. 1957, p. 1368-1372.

8 ref. (B14h; Mn, RM-n)

44-B. (French.) **Results of Creep Tests of the Pilings of Cowpers.** J. Baron. *Institut de Recherches de la Siderurgie, Publications,* Series A, no. 131, Feb. 1957, p. 78-87.

Creep tests give good indications on the resistance of refractories loaded at high temperatures. The hypotheses made by Dale are confirmed. The most important factor is the structure of the material. (B19d, W17m)

45-B. (Czech.) **Metallurgical Characteristics and Classification of Iron Ores.** Miroslav Prouza. *Hutnické Listy,* v. 12, Nov. 1957, p. 1020-1026.

Iron ores evaluated from standpoint of blast furnace technology demands. Present quality standards are supplemented with technological properties directly connected with the working of the furnace. 10 ref. (B general, S22; Fe, RM-n)

46-B. (German.) **Smelting Trials With Swedish Ore Pellets.** Alfred Reckmann and Walter Misch. *Stahl und Eisen,* v. 78, Jan. 9, 1958, p. 21-27.

6 ref. (B16a, D1a; Fe, RM-n)

47-B.* (Russian.) **Intensification of Sintering Process by Burning Limestone on Top of Sinter Bed (for Later Use of Resulting Lime in Sinter Mix).** D. A. Kissin and A. V. Drimbo. *Stal',* v. 17, Oct. 1957, p. 868-873. (Henry Brutcher, Altadena, Calif., Translation no. 4068.)

Chemical composition of the raw materials. Details of sintering process where limestone is burned on the surface of the burden in the sintering plant. Design of the plant. Influence of moisture, quantity of fuel, burden charge and limestone size upon the degree of limestone burning and the time of sintering. Production possibilities. (B16a; Fe, RM-n)

48-B.* Research Leading to the Design of the Guest Keen Iron and Steel Sintering Plant. Robert Parker. *Blast Furnace and Steel Plant,* v. 45, Dec. 1957, p. 1395-1405.

Principles determining design of an English plant and results of pilot plant investigation of sintering. Effect on sinter quality and output of coke size, dry mixing, wetting, pelletizing, use of deeper sintering beds, basicity, heat input at ignition, coke and moisture percentage and lime additions. (B16a; Fe)

49-B.* New Process Developed for Treating Iron Ore Concentrates. *Blast Furnace and Steel Plant,* v. 45, Dec. 1957, p. 1430-1431.

Process formed finely ground magnetite concentrate into pellets followed by drying with hot gases at 600 to 800° F., oxidizing at 1750 to 1850° F. to convert magnetic to hematite and then pellets are heat treated at about 2400° F. in rotary kiln to develop optimum pellet strength. Process evaluated on pilot-plant scale. (B16b; Fe)

50-B. Addition of Pulverized Calcitic Limestone to Magnetite Concentrates and Its Beneficial Effects on Improved Sinter Quality and Increasd Blast Furnace Production. R. K. Glass. *Blast Furnace and Steel Plant,* v. 46, Feb. 1958, p. 198-204.

(B16a, D1; AD-r)

51-B.* Fundamental Researches Into the Iron Ore Sintering Process. R. Wild. *Imperial College Chemical Engineering Society, Journal,* v. 10, 1956, p. 33-50.

Laboratory sintering technique using inert materials was developed. Study of temperature distribution and time for completion of sintering in relation to bulk density of material used, gives basis for concept of a relatively constant air requirement for sintering unit weight of mix. Use of a wide range of water and calcium carbonate in the mixes clarified relationship between fuel needed and chemical reactions involved. Over-riding influence of heat transfer in the sintering process demonstrated; air required for sintering is largely governed by relative heat capacities of solid particles and the air. Use of fuels with different reactivities and atmospheres with different oxygen contents shows that maximum efficiency is obtained when heat transfer rate and rate of fuel combustion are correctly matched. 22 ref. (B16a; Fe)

52-B.* Metallurgical Practice at the Cam and Motor. *Mining Journal,* v. 249, Nov. 22, 1957, p. 612-613.

Concentration processes; cyanide plant at mine of Southern Rhodesia's largest Au producer. Ore is refractory to cyanide treatment and requires roasting. Plant treats 800 tons of ore per day. (B14, B15; Au)

53-B. Concentration of Beach Sands From Taree, N. S. W. S. B. Hudson. *University of Melbourne—Ore Dressing Investigations,* Report no. 529, Apr. 1957, 10 p.

Electrostatic and magnetic separation applied to a gravity concentrate yielded rutile concentrates assaying 96.0% TiO and recovering 94% of the rutile in the head sample, and a zircon concentrate assaying 99.2% zircon and recovering 92% of the zircon in the head sample. (B14j, B14n; Ti, Zr)

54-B. Treatment of Copper Tailings From Lloyd Mine, Burraga, N.S.W. J. T. Woodcock. *University of Melbourne, Ore Dressing Investigations,* Report no. 530, Apr. 1957, 18 p.

After desliming, treatment of sand by percolation to extract oxide copper was satisfactory. Grinding and flotation of leach residue satisfactorily recovered the sulphide copper. Over-all recovery from classifier sand was 93% or 63% of the Cu in the original feed. (B14, Cu)

55-B. Recovery of Monazite From Weakly Magnetic Beach Sand Minerals From Swansea, N.S.W. S. B. Hudson. *University of Melbourne, Ore Dressing Investigations,* Report no. 542, Sept. 1957, 12 p.

Over 96% of the monazite in the weakly magnetic fraction derived from dry treatment of a beach sand concentrate can be recovered in concentrates assaying 92.3% monazite, by using table concentration and magnetic and electrostatic separation of the table concentrate and redressing of the tailings. (B14; Th)

56-B.* (French.) **Influence of Grain Size on the Kinetics of Contraction of Agglomerates of Ex-Carbonyl Iron During Roasting in the Alpha Phase.** Georges Cizeron. *Comptes Rendus,* v. 245, Dec. 4, 1957, p. 2051-2054.

Kinetics of contraction of agglomerates of ex-carbonyl iron can be greatly modified by varying temperature during a single roasting operation. Speed of densification can be accelerated or retarded by having second part of treatment take place at higher or lower temperature than that used at beginning of roasting. This phenomenon is closely related to variation in grain size. 4 ref. (B15, 2-59; Fe)

57-B. (Swedish.) **The Vanadium Works at Otanmeki.** Martti Merenmies. *Teknisk Tidsskrift,* v. 87, Sept. 10, 1957, p. 723-724.

Metal content of the ore; ore preparation; extraction of vanadium pentoxide. (B14; V)

Extraction and Refining

83-C. Close pH Control Eases Uranium Bottleneck. *Chemical Engineering,* v. 64, Dec. 1957, p. 151-152.

Overcoming problems of dwindling flow through RIP circuit and yellow cake filters through control of pH to an optimum range and change in method of pH adjustment prior to ion exchange. (C19s; U)

(*)Articles Available Through Photocopy Service; See Coupon, p. 63.

84-C.* **Fractional Precipitation Processes for Liquid Metal Fuels.** Robert J. Teitel. Paper from "Liquid Metals Technology", Pt. 1. Chemical Engineering Progress Symposium Series, p. 25-33.

Experimental data on the distribution of rare-earth tracers between precipitated uranium, intermetallic compounds and their liquid phases for U-Bi, U-Pb-Bi, U-Pb-Sn and U-Pb-Bi-Sn alloy systems. Complete fuel processing cycle proposed and tested for dispersion of U-Sn in Pb-Bi-Sn system.
(C27, T11g; U, *Bi, Pb, Sn,* 14-60)

85-C. **Simple Method for Semi-Continuous Casting of Bronze. Pt. 2.** E. C. Ellwood, J. C. Prytherch and E. F. Phelps. *Industrial Heating,* v. 24, Dec. 1957, p. 2532-2536.

Superior quality of rod cast by graphite die machine.
(C5q, 1-52; Cu-s)

86-C.* **Effects of Crystal Orientation, Temperature, and Molten Zone Thickness in Temperature-Gradient Zone-Melting.** J. H. Wernick. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1169-1173.

Experimental study of movement of Al-rich wire zone across surface of single crystals of Ge. Effect of crystal orientation, temperature and diameter of wire zone on travel. 5 ref. (C28k; Ge, Al)

87-C.* **Electrolytic Preparation of Thorium Metal.** B. C. Raynes, J. C. Bleiweiss, M. E. Sibert and M. A. Steinberg. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1373-1380.

Process for production of Th by fused salt electrolysis. Preparation of anhydrous oxide-free thorium chloride. Electrolysis of this salt in molten sodium chloride and removal of granular coarsely crystalline Th. Structure and mechanical properties of product Th. 30 ref.
(C23p; Th)

88-C. **Dissolution of Pyrite Ores in Acid Chlorine Solutions.** M. I. Sherman and J. D. H. Strickland. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1386-1388.

Apparatus and technique for measuring rate of dissolution in iron sulphide or in chlorine water. Results obtained shown only ferric ions and sulphate ions were produced and reaction is diffusion controlled with energy of activation of about 5000 cal. per mole. 17 ref.
(C19n, P13a; Fe, RM-n)

89-C. (Japanese.) **Titanium Enrichment in Aluminum-Titanium Alloys by Aluminum Monochloride.** Kiyoaki Obara and Fumio Mochizuki. *Light Metals (Tokyo),* v. 7. Sept. 1957, p. 5-9. 13 ref. (C19; Al, *Ti*)

90-C. **For Higher Purity Metals.** *Chemical and Engineering News,* v. 36, Feb. 10, 1958, p. 51-52.

Electron bombardment melting points the way to cheaper Ti, ductile Cb. (C5k; Cb, Ti)

91-C. **Extracting Uranium.** *Metal Industry,* v. 92, Jan. 10, 1958, p. 30-32.

Process for solvent extraction from acid leach liquors.
(C19n; U)

92-C.* (Italian.) **Contribution to the Industrial Refining of Zinc by Zone Melting.** G. Scacciati and P. Gondi. *Metallurgia Italiana,* v. 49, Nov. 1957, p. 774-782.

Theoretical limits of removal of Pb only from electrolytic Zn determined by laboratory tests. Quantities of about 100 kg. were then processed to determine optimum operating conditions, power consumption and practical limit of purity possible in industrial application. 14 ref. (C28k; Zn, *Pb*)

93-C.* **Chemical Engineering in the Nuclear Power Industry.** J. M. Kay. *Imperial College Chemical Engineering Society, Journal,* v. 10, 1956, p. 7-12.

Processes involved in extraction of U from ores and fabrication into fuel elements; processing of irradiated fuel. (C19, A11d, T11g; U, 14-70)

94-C. **Production of Hafnium. Pt. 1.** H. P. Holmes, M. M. Barr and H. L. Gilbert. *Industrial Heating,* v. 25, Jan. 1958, p. 44-50.
(C19; Hf)

95-C.* **Recovery of Nickel From Spent Nickel Catalyst.** K. E. Bharucha, J. G. Kane and D. Rebello. *Journal of Scientific and Industrial Research,* v. 16, Section A, Sept. 1957, p. 415-419.

Processes involving digestion with sulphuric, nitric, hydrochloric, formic or acetic acids. 10 ref.
(C19, A11d, T29d; Ni)

96-C.* **Uranium Recovery for Spent Fuel by Dissolution in Fused Salt and Fluorination.** G. I. Cathers. *Nuclear Science and Engineering,* v. 2, Nov. 1957, p. 768-777.

Promising nonaqueous process consists of dissolution of the fuel element in a fluoride melt by hydrofluorination at 600 to 700° C., direct fluorination for the production and volatilization of UF_6, with further decontamination of the UF_6 from fission product activity secured in an NaF absorption-desorption step. Good decontamination is obtained in the fluorination step due to the low volatility of most of the fission product fluorides. An over-all decontamination factor greater than 10^6 with adequate U recovery has been demonstrated. A pilot plant has been constructed for testing the process with various heterogeneous fuel elements. 4 ref.
(C19a, A11d, T11g; U, 14-70)

97-C. **A Critique of Vacuum Methods.** *Steel,* v. 142, Jan. 13, 1958, p. 79-81, 84.

Outstanding features of various methods of melting and specific applications. (C25, C5, D8m, 1-73)

D Iron and Steelmaking

63-D.* **The Basic Roof-Extended Hearth-Use of Oxygen Firing Rates at Granite City Steel Co.** Arthur L. Howard. *Blast Furnace and Steel Plant,* v. 46, Jan. 1958, p. 49-51.

The main disadvantage of the basic roof, in that it loses strength with high temperatures, is overweighed by the fact it can stand higher temperatures, in excess of 3500° F. compared with 3000 to 3100° F. for the silica brick roof. Higher temperatures, of course, mean shortened melt-down time, and thus less heat time.
(D2, W18r; ST, RM-h)

64-D.* **Heat Flow in Ingot Hot-Top.** G. Fenton. *Blast Furnace and Steel Plant,* v. 46, Jan. 1958, p. 70-72.

Measurement of heat losses from the hot-tops of 9-in. square ingots have enabled the relative importance of the different heat losses, and their variation over the solidification period, to be assessed. The heat content of the refractory is shown to account for by far the greatest proportion of the total heat loss, so that the vtial property of any hot top tile is its thermal capacity rather than its conductivity.
(D9m; ST, 5-59)

65-D.* **Techniques and Problems in Vacuum Melting.** Edward A. Loria. *Blast Furnace and Steel Plant,* v. 46, Jan. 1958, p. 73-78.

Vacuum melting, the variation of pressure and melt atmosphere during melting, refining and casting, exerts its major effect on the control of gas content and of minor elements (normally nongaseous). Involved in the former are melting atmosphere reactions, deoxidation practice and the control of gas evolution during solidification; while the latter is concerned with the removal of nongas trace elements by distillation and the control of refractory reactions. (D8m; ST)

66-D.* **Recarburization of Molten Iron in a High Speed Rotary Vessel.** R. I. Higgins and J. C. Billington. *British Cast Iron Research Association, Journal of Research and Development,* v. 7, Dec. 1957, p. 95–104.

Small-scale experiments which encourage the belief that this process could be conveniently achieved at low cost by dissolving coke breeze in the molten iron in a high-speed rotary vessel. An appreciable drop in temperature is associated with the recarburization of molten Fe by means of cold carbon additions, and although the experimental technique employed did not permit this to be measured, caculations have been made to indicate the magnitude of the effect. 11 ref. (D8n; ST)

67-D. **Direct Reduction of Iron Ore in the United States.** Harry W. McQuaid. *Iron and Steel Engineer,* v. 35, Jan. 1958, p. 69-77.

High investment cost of the blast furnace-openhearth combination has put it on the defensive, and the electric arc furnace is one way of meeting increased steel demand at a minimum capital cost. Since scrap supplies and prices are erratic, attention has been paid to the development of the direct reduction process. (D8j, A4s; ST)

68-D. **The Steel Industry of Mexico —Its Present and Immediate Future.** *Iron and Steel Engineer, Journal,* v. 35, Jan. 1958, p. 80-87.
(D general, A4; ST)

69-D. **Developments in Metallic Recuperators.** Thomas E. Dixon and Heinz A. Kuhne. *Iron and Steel Engineer,* v. 35, Jan. 1958, p. 127-138.

Details of several designs of European recuperators with some American examples. (D1b, 1-55; ST)

70-D.* **Oxygen Rejuvenates the Converter Process.** E. C. Wright. *Metal Progress,* v. 73, Jan. 1958, p. 65-71.

The Linz-Donawitz (L-D) process of blowing impurities out of pig iron with a stream of pure oxygen striking the top of the bath is now operating in Hamilton, Ont., and Detroit. The prediction is made that its use will expand rapidly in America where new steel capacity is needed. (D10a; ST)

71-D.* **Continuous Casting of Gray Iron.** Adalbert Wittmoser. *Metal Progress,* v. 73, Jan. 1958, p. 83-87.

Rounds, and especially tubes, of gray iron are now cast in a collar mold and slowly withdrawn downward in tempo with the pouring rate. Gas and water pipe in sizes up to 3 ft. diameter and 33 ft. long, as well as large cylinder liners, are being made in quantity in a West German foundry. (D9q; CI-n)

72-D. (French.) **Control and Regulation of Openhearth Furnaces. A Study of the Factors Having an Influence on Their Operation.** R. Alleyrac, L. Septier, M. Faure, R. Ferry and Hoang Chan. *Institut de Recherches de la Siderurgie, Publications,* Series A, no. 167, Aug. 1957, 127 p.

A study of operation of openhearth furnaces in two plants having 70 furnaces. The productivity of the furnaces was improved 5 to 10% without any increase of the fuel consumption. The life of the roofs of the furnaces was increased. (D2, W18r; RM-h, ST)

73-D. New Deoxidizing and Desulphurizing Practice for Improved Steel Quality. V. A. Skachko and N. P. Merenkov. *Stal',* v. 17, no. 6, 1957, p. 521-522. (Henry Brutcher Translation no. 4080, Altadena, Calif.)

Previously abstracted from original. See item 300-D, 1957. (D9r; ST, *Al*)

74-D. (German.) **Adjustment of Openhearth Furnaces.** Wilhelm Liesegang. *Siemens Zeitschrift,* v. 31, Oct-Nov. 1957, p. 447-481.

8 ref. (D2, W18r)

75-D.* (German.) **Metallurgy of Ferromanganese.** Gerhard Heynert, Jacob Willems, Willy Oelsen and Eberhard Schürmann. *Stahl und Eisen,* v. 77, Nov. 28, 1957, p. 1717-1728.

Phenomena occurring during the production of ferromanganese in the blast furnace; relations between Mn, Si and C; conditions necessary for production of alloys rich and poor in Si; adequate slag ranges. 27 ref. (D1; Fe, Mn, AD-n, RM-q)

76-D. (German.) **Design, Equipment and Operational Results of a Double-Chimney Openhearth Furnace.** Ernest Goebel and Heino Leopold. *Stahl und Eisen,* v. 77, Nov. 28, 1957, p. 1733-1739.

(D2, W18r)

77-D. (German.) **Survey of Steel and Steel Alloy Manufacturing Methods.** Franz Sommer. *VDI Zeitschrift,* v. 99, Oct. 21, 1957, p. 1517-1525.

A general discussion on steelmaking; data on properties and applicability of many steel alloys. 10 ref. (D general, Q general, 17-57; ST)

78-D. (Russian.) **Soviet Blast Furnace Production.** I. A. Nekrasov. *Stal',* v. 17, Nov. 1957, p. 965-968.

(D1, A4p; ST)

79-D. (Russian.) **Experience in the Operation of a 500-Ton Openhearth Furnace.** G. A. Garbuz, M. P. Sabiev and E. A. Ploshchenko. *Stal',* v. 17, Nov. 1957, p. 976-982.

Largest openhearth furnace in Europe. Construction, installation and operation, shortcomings. (D2, W18r)

80-D. (Russian.) **High-Grade Steel Industry in U. S. S. R.** A. S. Nikolaev. *Stal',* v. 17, Nov. 1957, p. 976-991. (D general, A4; ST)

81-D. (Russian.) **Progress in Converter Production.** S. G. Afansev. *Stal',* v. 17, Nov. 1957, p. 982-987.

21 ref. (D3)

82-D. (Russian.) **Automation of Thermal and Production Processes in the Iron and Steel Industry.** V. V. Vorobei and A. M. Zimakov. *Stal',* v. 17, Nov. 1957, p. 1024-1027.

Application of automation to blast furnace and electric furnaces and to rolling mills. Several research institutes dedicate their entire effort to furthering automation in this industry. (D general, F23, 18-74; ST)

83-D.* (Czech.) **Thermodynamic Investigation of Reactions of Iron Desulphurization and Dephosphorization.** L. A. Svarcman. *Hutnické Listy,* v. 12, Nov. 1957, p. 965-970.

Radioactive isotopes are used to determine sulphur and phophorus distribution in liquid iron and slag. Accuracy does not depend on absolute concentration of element distributed. Higher concentration in metallic than in slag phase and vice versa may be determined by two appropriate methods given. Equipment enables determination of distribution coefficients for constant chemical composition of the slag and variable temperature. 11 ref. (D10n, P12, 1-59; Fe, *S, P*)

84-D. (Czech.) **Vacuum Desulphurization of Pig Iron.** A. M. Samarin and Ivan Kasik. *Hutnické Listy,* v. 12, Nov. 1957, p. 970-974.

11 ref. (D10n, D1, 1-73; Fe, *S*, AD-a)

85-D.* (Czech.) **Effect of Manganese-Silicon and Aluminum as Deoxidizing Alloys and on Quantity and Arrangement of Nonmetallic Inclusions in Steel.** Theodor Myslivec. *Hutnické Listy,* v. 12, Nov. 1957, p. 989-1000.

Complex ferromanganese-silicon-aluminum and ferromanganese-silicon alloys were added in the solid and liquid state. The former is superior as to quantity and composition of the inclusions as well as in wider application despite a lower Mn:Si ratio. Aluminum oxide formed in steel during the process, from small Al additions, prevents formation of high-melting silicates. Application of liquid deoxidizing alalloys is advantageous. 10 ref. (D9r; D10r; ST, 9-69, AD-r)

86-D. (Czech.) **Effect of Sulphur Concentration on Kinetic Parameters of Iron Desulphurization.** Jiri Skala and Oleg V. Travin. *Hutnické Listy,* v. 12, Nov. 1957, p. 1000-1008.

31 ref. (D10n, D1; Fe, *S*, AD-a)

87-D. (Czech.) **Converter Technology Using Oxygen in the U.S.S.R.** F. Krumnikl and J. Bartos. *Hutnické Listy,* v. 12, Nov. 1957, p. 1026-1033.

(D3f; ST)

88-D. (Czech.) **Methods of Continuous Steel Casting in the U.S.S.R.** Frantisek Jansch. *Hutnické Listy,* v. 12, Nov. 1957, p. 1033-1039.

(D9q; ST)

89-D. (Czech.) **Homogeneity of Very Heavy Ingots and Its Effect on Mechanical Properties.** Oldrich Bohus. *Hutnické Listy,* v. 12, Nov. 1957, p. 1039-1045.

Specifications for production, pouring and solidification of ingot sections of basic steel weighing 80 tons. 10 ref. (D9, 5-59; ST)

90-D. (German.) **Dephosphorization of Iron by High-Lime Slags.** Gerhard Tromel and Hans Werner Fritze. *Archiv für das Eisenhüttenwesen,* v. 28, Aug. 1957, p. 489-495.

Experiments showed that the phosphorus and oxygen content of iron under lime-saturated slags rises with increasing temperatures. In the temperature range of 1600° C., saturation areas for the systems CaO-P_2O_5-FeO and CaO-P_2O_5-FeO-SiO_2 are represented in special multidimensional saturation diagrams, developed for complex multi-component systems. 6 ref. (D2d, D11n; Fe, RM-q)

91-D.* (German.) **Behavior of Hydrogen in Oxygen-Steam Converter Process.** Herbert Neuhaus. *Stahl und Eisen,* v. 77, Dec. 26, 1957, p. 1863-1867.

Solubility of hydrogen, analytical methods of determination, hydrogen content in the converter steel when using different blast mixtures, hydrogen movement. 16 ref. (D3, S11r; ST, *H*)

92-D.* (German.) **Desulpuhrization in the Basic Openhearth Furnace.** Karl-Georg Speith, Hans von Ende and Gustav Mahn. *Stahl und Eisen,* v. 78, Jan. 9, 1958, p. 27-34.

Effect of Mn and temperature on sulphur content of first sample. Desulphurization during boiling period in melting with and without Mn reduction. Sulphur content during tapping. Effect of slag composition in desulphurization under oxidizing slags. Chemical combination of sulphur in the slag. 17 ref. (D2d, D10n; ST, *S*)

93-D. (Polish.) **Computation of the Quantity of Combustion Gases and Air in Openhearth Process.** J. Szargut and J. Machniewicz. *Hutnik,* v. 24, Oct. 1957, p. 391-397.

Balance of carbon, hydrogen, oxygen and nitrogen in openhearth process. Computation of stack losses. Calculation examples. (D2h)

94-D. (Russian.) **Prevention of Dust Formation on Blowing Oxygen Through the Molten Bath.** G. S. Selkin and N. I. Zadalya. *Stal',* v. 17, Oct. 1957, p. 884-887. (Henry Brutcher, Altadena, Calif., Translation no. 4056.)

Minimizing wear and dust generation of openhearth furnaces with oxygen blast by substituting oxygen-water vapor mixture for pure gas. (D2g, A8a)

95-D. (Russian.) **Contamination of Ball-Bearing Steel With Refining Slag.** V. F. Smolyakov, E. S. Kalinnikov and V. D. Potapov. *Stal',* v. 17, Oct. 1957, p. 893-898.

Method of impurity determination. Contamination in electric furnace was higher with free flowing slags and lower with basic, heavy-consistency slags. (D5d, D11n, 9-69; ST, SGA-c)

96-D. (Russian.) **Melting of Chromium-Nickel Steel Using Pelletized Nickel Oxide.** I. P. Zabaluev, T. M. Bobkov and N. T. Tareshchuk. *Stal',* v. 17, Oct. 1957, p. 899-901.

Details and advantages of high-alloy steel melting in electric arc furnaces introducing Ni in a form of pelletized NiO. (D9r, D5c; AY, *Ni*, AD-n)

97-D.* Heat Flow in Ingot Hot-Top. G. Fenton. *Blast Furnace and Steel Plant,* v. 45, Dec. 1957, p. 1415-1422.

Investigation by thermocouples and radiation pyrometers on nature and rate of heat flow and heat loss in ingot hot tops made of fire brick, insulating brick and with vermiculite insulation; 500-lb. ingots of silicon-killed carbon steel were cast and the rate of heat transfer and its effect on piping for the different hot top steels determined. Heat retained by hot top refractory accounted for more than 50 to 75% of the heat loss from the feeder head of the ingot. (To be continued.) (D11k, D9, P11k; ST, 5-59)

98-D. Broken Hill Proprietary Co., Ltd. Maker of Steel for Australia. Colin Y. Syme and Norman E. Jones. *Blast Furnace and Steel Plant,* v. 46, Feb. 1958, p. 170-197.

Plant layout, equipment, capacity, resources, raw materials and organization of the company. (D general, 18-17, 1-52; ST)

99-D. Steel Made by Basic Oxygen Process at Aliquippa. *Blast Furnace*

(*)Articles Available Through Photocopy Service; See Coupon, p. 63.

and Steel Plant, v. 46, Feb. 1958, p. 205-208.
(D10)

100-D.* **Electric Arc Furnace Practice.** D. P. Patell. *Institution of Engineers, Journal (India),* v. 38, Sept. 1957, p. 84-114.

Principles, description, operation of arc furnaces. 6 ref.
(D5, W18s; ST)

101-D.* **Getting More Iron From Blast Furnaces.** *Steel,* v. 141, Dec. 9, 1957, p. 164-176.

Effect on furnace operation and output of beneficiation of iron ore, sintering, improved coke quality, sizing of limestone, use of moisture and oxygen in blast, higher blast temperatures and higher top pressures. (D1; Fe)

102-D.* **Hydrogen in Electric Steelmaking.** T. W. Merrit. *Vancoram Review,* v. 12, Fall 1957, p. 14-15, 25.

In experiments to establish quantitatively effect of some of variables which determine final hydrogen content of steel, moisture content of air in furnace was found to be most important factor in determining H absorption into molten steel; rate of H absorption and total time steel was in furnace following oxidation period appear to have determined final H content of steel at top.
(D5, N15e; ST, *H*)

103-D. (Hungarian.) **Data on Openhearth Furnaces Fired With Cold Coke Oven Gas.** Gellért Répasi. *Kohaszati Lapok,* v. 12, Aug-Sept. 1957, p. 403-410.
(D2h; RM-m38)

E Foundry

111-E.* **Effect of the Size of K-Bar Test Castings on Their Shrinkage Defects.** T. J. Szajda. *British Cast Iron Research Association, Journal of Research and Development,* v. 7, Dec. 1957, p. 110-128.

Influence of the size of K-bar test castings and of the pouring temperature in the range 1415 to 1470° C. upon the occurrence and location of a number of shrinkage defects. Maximum drawing occurred at a pouring temperature of about 1450° C. As the pouring temperature decreased over the range 1450 to 1415° C., draws were replaced by sinks. A criterion for estimating the severity of shrinkage defects on the basis of their location and frequency of occurrence at different positions in the test casting is also suggested. 4 ref. (E25n, 1-54; 9-68)

112-E. **Foundry Industry in Sweden.** Lars Villner. *Castings,* v. 3, Oct. 1957, p. 22-33.
(E general)

113-E. **An Aluminum Casting With a Guarantee.** *Design Engineering,* v. 3, Dec. 1957, p. 49.

New process which raises tensile strength to 38,000 psi., yield strength 27,000 psi. and elongation 5%, thus making possible many new uses for Al investment castings. (E15; Al)

114-E. **Injection of Swarf Into the Cupola.** S. H. Chrobok. *Engineer,* v. 22, Oct. 1957, p. 48-55.

Techniques for melting scrap.
(E10a; CI, RM-p)

115-E. **Forty Years in and Around Foundries.** W. L. Hardy. *Foundry Trade Journal,* v. 104, Jan. 2, 1958, p. 3-10.

Critical assessment in which earlier methods of coremaking, molding, metal melting and pouring are summarized and compared with modern techniques. (E11)

116-E. **Austenitic Manganese—Steel Technology in an Australian Foundry.** Hedley Thomas. *Foundry Trade Journal,* v. 104, Jan. 2, 1958, p. 11-14.

Melting, pouring, molds and cores, heat treatment, chemical control, physical testing, metallography and methods of Mn determination.
(E11, *Mn,* SS-e)

117-E. **Ford's New Foundry.** *Iron and Steel,* v. 31, Jan. 1958, p. 15-17.

Design of new "Thames" foundry at Dagenham, Essex, England.
(E general, A5)

118-E. **Die Casting Practice at the Works of Metal Castings, Ltd.** *Machinery,* v. 91, Dec. 27, 1957, p. 1507-1516.
(E13)

119-E.* **Review of Die Casting Practices Abroad.** Donald L. Colwell. *Metal Progress,* v. 73, Jan. 1958, p. 88-90.

European Al die castings are made in proportionately higher tonnage than Zn; in both kinds the chemical specifications are higher than in America. Aluminum castings with silicon-free surfaces, capable of anodizing and coloring, are sought on both sides of the ocean.
(E13; Al, Zn)

120-E. **Precision Toolmaking Aids Shell-Molding.** Otto W. Winter. *Metalworking Production,* v. 101, Nov. 29, 1957, p. 2133-2137.

Patterns and core boxes (thermodies) perform at 500° F. and perform a heat transfer function.
(E19c, 2-61)

121-E. (French.) **Casting of Copper Alloys in Chill Molds.** Maurice Billing. *Fonderie,* v. 140, Sept. 1957, p. 391-397.

The casting of Cu alloys in chill molds results in lower costs, better dimensional accuracy and finer structure. Cu-Al alloys, brasses and tin bronzes are cast. The chill molds are made of pearlitic cast iron. Feeding of the mold and temperature of casting. Brass used in chill molds is cheap because purity is not too important. A Cu content of only 61% is necessary. Control of composition; difficulties and remedies. 10 ref. (E22r; Cu)

122-E. (French.) **Use and Preparation of Resin Pretreated Sand in Shell Molding.** A. Woods. *Fonderie Belge,* Nov. 1957, p. 269-273.

Advantage of resin; raw materials. (E19c, E18n; NM-d34)

123-E. (French.) **Description of Three Small Foundries for Gray Cast Iron. Pt. 2.** *Fonderie Belge,* Nov. 1957, p. 274-281, 290.

Description of the foundries; productivity; details of the processes used. (E general, 18-67; CI-n)

124-E. (French.) **Modernization of Foundries.** A. Plesinger. *Fonderie Belge,* Nov. 1957, p. 285-289.

Two factors of productivity are studied: substitution of manual work by mechanical operations and organization of molding areas. (To be continued.)
(E general, W19, 18-67, 18-74)

125-E. (German.) **Use of Zircon Sand in Producing Large Steel Castings.** F. Paschke. *Giesserei-Praxis,* v. 75, Oct. 1957, p. 456-459.
(E10, E18; ST)

126-E. (German.) **Basic Hot Blast Cupola Furnace in the Iron Foundry.** *Giesserei-Praxis,* v. 75, Oct. 1957, p. 460-462.

Equipment and operations in gray cast iron foundries.
(E10a, 1-52; CI-n)

127-E. (German.) **Chill Molds for Circular Light Metal Parts.** Ernst Brunhuber. *Giesserei-Praxis,* v. 75, Oct. 25, 1957, p. 464-466.

Construction and operation of multiple part molds. (E22r)

128-E. (German.) **Manufacture of Heavy Section Castings.** Ferdinand Löwe. *Giessereitechnik,* v. 3, Oct. 1957, p. 219-221.

Heating walls of risers affect vacuum action causing flow toward solidifying casting. (E25n, E22q)

129-E. (German.) **Design and Casting Quality.** Herbert Klotz. *Giessereitechnik,* v. 3, Oct. 1957, p. 221-225.

Reduction of tearing of cast iron by new design and placing of core parts. (E11, 17-51; CI)

130-E. (German.) **Recent Developments in the Field of Malleable Castings.** Karl Roesch. *Stahl und Eisen,* v. 77, Nov. 28, 1957, p. 1747-1751.

Production of blackheart and whiteheart malleable iron; effects of melting, chemical composition and heat treatment on structure and mechanical properties. Modern gas annealing plants. 13 ref.
(E general, J23b, CI-s)

131-E. (Swedish.) **The Carbon Dioxide Process.** D. V. Atterton. *Gjuteriet,* v. 47, Oct. 1957, p. 157-166.
12 ref. (E18n)

132-E. (Swedish.) **Development of High Duty Malleable Cast Iron.** Bertil Thyberg. *Gjuteriet,* v. 47, Nov. 1957, p. 179-188.

Pearlitic malleable iron of higher tensile strength, improved yield point and elongation; possibilities for hardening. 9 ref.
(E general, J28; CI-s)

133-E. (Swedish.) **Swelling of Wooden Patterns.** Lars Lange. *Gjuteriet,* v. 47, Nov. 1957, p. 189-192.

Dimension changes caused by various storage practices and foundry defects resulting. (E17, E19, 9)

134-E. (Japanese.) **Quality Improvement in Die Casting.** Hiroshi Asada, Tomonobu Kanno, Kazuo Matsushita and Jiro Wada. *Light Metals (Tokyo),* v. 7, Sept. 1957, p. 55-63.

Temperature control, variation of die-temperature distribution. 3 ref.
(E13, W19n)

135-E. (Japanese.) **Solidification of Pure Aluminum. Pt. 5.** Yoshinobu Nakao. *Light Metals (Tokyo),* v. 7, Nov. 1957, p. 5-15.

Effects of Ti on the cast structure solidified under various cooling conditions. 12 ref.
(E25n, N12, Al-a, *Ti*)

136-E. (Japanese.) **Study of Causes of Hydrogen Inclusion in Aluminum Using Deuterium as Tracer.** Yoshitsugu Mishima, Shizo Hirano, Naoaki Takahashi and Iichi Ogahara. *Light Metals (Tokyo),* v. 7, Nov. 1957, p. 16-20.
(E25s, 1-59; Al, *H*)

137-E. (Japanese.) **Effect of a Small Amount of Beryllium on Aluminum-Magnesium Alloys.** Toyoji Ushioda, Osamu Yoshimura and Shoichiro Mashiyama. *Light Metals (Tokyo),* v. 7, Nov. 1957, p. 29-33.
6 ref. (E25, 2-60; Al, *Be, Mg,* AD-p)

138-E. (Japanese.) **Improvement of Magnox Alloys Used for Canning Material in Carbon Dioxide Gas-Cooled Reactor.** Yoshitsugu Mishima and Naoaki Takahashi. *Light Metals (Tokyo),* v. 7, Nov. 1957, p. 68-72.

Mg-Al-Ca-Be alloys with varying amounts of Ca and Be were pre-

(*)Articles Available Through Photocopy Service; See Coupon, p. 63.

pared and the effect of Ca and Be on the properties of the alloys confirmed. 5 ref.
(E25, T11, 2-60, 2-62; Al, Mg, *Ca, Be*)

139-E.* **Influence of Sulphur on the Castability, Tensile Properties, and Pressure Tightness of Sand-Cast Bronzes and Gunmetals.** H. Reiter. *British Foundryman,* v. 51, Jan. 1958, p. 2-10.

Elementary sulphur was added to 85-5-5-5 and 80-10-2 gunmetals and 90-10 phosphor bronze from which D.T.D. bars, disks wtih inadequately fed bosses, and fluidity and castability test castings were cast in green-sand molds. A metal mold was used for comparing hot tearing characteristics. Results of this work showed that sulphur contents up to 0.3% had no deleterious effect on porosity, grain structure, tensile strength, and pressure tightness, or on the other properties examined. 15 ref.
(E25p, Q27a, 2-60, Q26q; Cu, *S*)

140-E.* **Pressure or Diaphragm Moulding.** Tom Barlow. *British Foundryman,* v. 51, Jan. 1958, p. 10-16.

Successful practice of pressure molding depends on the use of a sand of high strength and high flowability and the use of a diaphragm to apply high-pressure air through the whole of the sand area, resulting in a mold of high over-all density free from the packing variations associated with normal jolt-squeeze ramming. The time of the process is almost independent of the size of the mold so that the use of large boxes with a number of patterns in each box is encouraged. 10 ref.
(E19, E18r, 3-74)

141-E.* **Surface Finish for Non-Ferrous Castings.** *British Foundryman,* v. 51, Jan. 1958, p. 17-35.

Mold additions appear to have little influence on finish. Certain mold and core binders are shown to have a beneficial influence on finish, especially shell molding and CO_2 binders. To a certain extent the influence of binders on finish is a reflection of their influence on the flowability of the sand. Other variables that influence surface finish are alloy type, extent to which the sand has been used and pouring temperature, whereas pattern quality, venting, and green versus dry sand had no significant effect. 35 ref. (E18n, 9-71; EG-a 38)

142-E.* **Use of Stearin Wax for Simulating Shrinkage Defects in Steel Castings.** D. B. James and J. M. Middleton. *British Foundryman,* v. 51, Jan. 1958, p. 36-46.

Provided that the pouring temperature does not exceed 2° C. superheat, the freezing of pure stearin wax can give a useful guide to the distribution of shrinkage in plain carbon steels containing 0.2-0.3% C. Since the solidification shrinkage of stearin wax is greater than steel the analogy cannot be taken too far—castings fed to soundness in wax would be over-risered when made in steel. The successful use of the simulation technique is limited to quite small castings. 13 ref. (E25n, 9-68; CN)

143-E. **Application of Quality Control to a Moulding-Sand System.** L. A. Deaville. *Foundry Trade Journal,* v. 104, Jan. 9, 1958, p. 33-36.

Report of a two-year investigation to obtain a sand of known and consistent quality, permitting variation of sand properties at will. Result has been a general improvement in casting quality. (E18)

144-E. **Pattern Details in Cast Iron.** *Foundry Trade Journal,* v. 104, Jan. 9, 1958, p. 39-41.

Use of metal inserts for the larger types of wooden patterns and corebores; suitable materials and specific examples. (E17; CI)

145-E. **Large Aluminium Die-Castings.** A. F. Bauer. *Metal Industry,* v. 92, Jan. 10, 1958, p. 23-25.

Machine developments, die design and stress and pressure tests.
(E13, W19n, 17-51; Al)

146-E. (German.) **Microporosity in Sand and Chill Mold Castings of Magnesium Alloys.** Paul Spitaler. *Giesserei,* v. 44, Dec. 1957, p. 757-766.

14 ref. (E25q, 9-68; Mg, 5-60, 5-66)

147-E. (German.) **Testing the Hardness of Molding Sand.** Wolfram Ruff. *Giesserei,* v. 44, Dec. 1957, p. 766-769.

Avoiding difficulties in testing by modifying the spring in the test apparatus; conversion of hardness values into Brinell units. (E18r, Q29)

148-E. (German.) **Production of Nodular Cast Iron With Addition of Compounds.** Nurettin Cuhadar. *Istanbul Teknik Universitesi, Bulteni,* v. 10, no. 2, 1957, p. 28-38.

Possibility of replacing Mg, Ce and Ca with their compounds. 16 ref.
(E25q; CI-r, *Mg, Ce, Ca*)

149-E. **Gleason Works Achieves Newness in a Foundry.** Robert H. Herrmann. *Foundry,* v. 86, Feb. 1958, p. 78-88.

Equipment, layout and procedures at the Gleason Works, Rochester, N. Y. (E general, 1-52, 18-67)

150-E.* **Shrinkage in Tin Bronze.** Clyde L. Frear. *Foundry,* v. 86, Feb. 1958, p. 92-97.

Effect, elimination and prevention of gas contaminants.
(E25n, Cu-s, *Sn*)

151-E. **Sodium-Silicate Bonded Steel Molds.** P. J. Ahearn and G. I. Gartner. *Foundry,* v. 86, Feb. 1958, p. 98-101.

Use of sodium silicate, or waterglass, as a substitute for resin.
(E19c; NM-f45)

152-E.* **Manufacture and Use of Large Aluminum Die-Castings.** Alfred F. Bauer. *Foundry,* v. 86, Feb. 1958, p. 102-106.

Present status of the die-casting process and outline of further application such as die cast V-8 engine blocks. (E13, 17-57; Al)

153-E. **Surface Finish of Steel Castings.** David V. Atterton. *Foundry,* v. 86, Feb. 1958, p. 107-111.

Sand fineness and grading, binder content, compaction, penetrating pressures, grain size, mold atmosphere, sand sintering and degree of ramming. (To be concluded.)
(E18, E11; ST)

154-E. **Forsterite Offers Advantages as Shell Mold Material.** W. H. Owen. *Foundry,* v. 86, Feb. 1958, p. 134-137.

Suggested practice for preparing forsterite grains mix for shell molding of steel. (E19c; ST, NM-f45)

155-E. **Casting Magnesium-Thorium Alloys.** Thomas A. Dickinson. *Foundry,* v. 86, Feb. 1958, p. 156-158.

(E general; Mg, *Th*)

156-E.* **Metallurgical Aspects of Hot-Tearing in Cast Steel.** Kurt Beckius. *Foundry Trade Journal,* v. 104, Jan. 30, 1958, p. 115-123.

Results of casting experiments made in an apparatus designed on the resistance-spring principle. The resulting curves for time-contraction relationships were compared with the occurrence of tearing as manifested in macro-etched, tear-containing sections of cast test bars. The contraction-restraining load imposed on the specimens was removed at different time intervals after pouring, and data collected were further supplemented by temperature measurements during cooling and solidification. (E25n, Q26p; ST)

157-E. **Why Bullard Prefers Gas Fuel in Most Modern Foundry.** *Industrial Gas,* v. 36, Dec. 1957, p. 3-4.

Gas fuel is used for all heating operations except basic iron melting.
(E general; CI, RM-m)

158-E. **Handling Units Speed Foundry Cycle.** *Iron Age,* v. 180, Dec. 5, 1957, p. 134-135.

Unit performs molding, closing and shaking-out operations without manual handling of flasks in foundry producing V-8 engine block castings. (E11, T21b, 18-74; CI)

159-E. **How to Cut Costs on Patterns and Cores.** R. B. Sinclair and W. N. Richards. *Iron Age,* v. 180, Dec. 12, 1957, p. 132-134.

Suggestions for simplifying and economizing in molding and coremaking and in pattern selection.
(E17, E21g)

160-E. **Production of F.H.P. Electric Motors.** *Machinery,* v. 91, Nov. 22, 1957, p. 1184-1195.

Aluminum die casting, machining, welding and other operations in production of small electric motors.
(E13, W11q, 17-57; Al)

161-E.* **Heat Transfer From Die Casting Dies.** H. K. Barton. *Machinery,* v. 91, Nov. 29, 1957, p. 1276-1283.

Nature and extent of heat input and heat losses in die casting Zn and Al. Requirements for water cooling, effect of variations in radiating surface and heat loss during interruptions in casting operations. Desirability of reducing thermal gradient; possibilities and requirements of high-temperature coolants. Thermal balance and question of die cavity surface temperature for production of sound castings.
(E13, P11k; Zn, Al)

162-E. **Cast Aluminum Products.** *Modern Metals,* v. 13, Nov. 1957, p. 82-86, 90-92.

(E general; Al, 17-57)

163-E.* **Heat Control in the Die Casting Process.** A. F. Bauer. *Precision Metal Molding,* v. 16, Jan. 1958, p. 46-47.

Five places where heat must be controlled are the alloying room where metals are heated and superheated, the holding furnace, the dies, where heat exchange usually takes place, injection mechanism, and preheating inserts where they are used.
(E13, A11e)

164-E. **Prototypes That Show Casting Design Flaws.** *Precision Metal Molding,* v. 16, Jan. 1958, p. 56-57.

Production of accurate die models; other services provided by a pattern and model shop. (E13, W19n, 17-51)

165-E. **Moulding Characteristics of Jubbulpore Pale Grey Sand.** U. C. Sharma and B. R. Nijhawan. *Scientific and Industrial Research, Journal,* v. 16, Section A, Sept. 1957, p. 424-427.

(E18r)

166-E. **Investment Caster Uses Vacuum.** *Steel,* v. 141, Nov. 25, 1957, p. 96-98.

Details of melting cycle and mechanical properties of vacuum investment cast Ni-base alloys.
(E15, 1-73; Ni)

(*)Articles Available Through Photocopy Service; See Coupon, p. 63.

167-E. **Carbon Arc Vs. Induction Melting.** *Steel,* v. 142, Jan. 27, 1958, p. 74-76.

Comparison of techniques on the basis of part design, relative cost, control or reproducibility of results and versatility, from data compiled at a foundry using both methods for investment casting.
(E10r; E15, W18a, W18s, 17-53)

168-E. (French.) **Rational Modernization of Foundries.** Adolphe M. Plesinger. *Fonderie,* v. 142, Nov. 1957, p. 481-490.

Mechanization in Czechoslovakian foundries described by staff member of Institute for Foundry Research in Brno. 11 ref.
(E general, 18-74)

169-E.* (French.) **Study of the Possibilities of Making Pressure-Tight Castings in Light Alloys.** Louis Grand. *Fonderie,* v. 142, Nov. 1957, p. 491-498.

Oil tests under pressure on castings made of 20 Al alloys provide classification in order of increasing porosity, both before and after machining. Refining with Na or a flux that releases Na on contact with molten metal reduced porosity. A 5.6% Si, 3% Cu alloy was found best suited to production of parts studied. 4 ref. (E25r; Al, *Si, Cu,* RM-q)

170-E.* (French.) **Study of Cores Bonded With Sodium Silicate.** Maurice Decrop and Marcel Goguillon. *Fonderie,* no. 142, Nov. 1957, p. 499-515.

Cores bonded with sodium silicate withstand storage well in ordinary atmosphere but present stripping problems; sodium silicate binders and CO_2 process are best suited to production of medium and large-size cores. Graphs give compressive strength of cores of various compositions in all stages of preparation and use; cracking, blowholes, shrinkage, ease of stripping and breakdown analyzed in terms of binder composition, temperatures, atmospheres, influence of sodium silicate and CO_2. (E21, E18n)

171-E. (French.) **Contribution to the Study of Riser Systems in the Casting of Steel: Case of a Gear.** Marcel Jaumain. *Fonderie,* v. 143, Dec. 1957, p. 545-550.

Gear was cast with eight different pouring and riser combinations and castings examined for soundness. 5 ref. (E22q, T7a; ST)

172-E. (German.) **Special Brass Alloying Technique.** E. Brunhuber. *Giesserei-Praxis,* no. 24, Dec. 1957, p. 521-523.

Influence of single components (Al, Sn, Fe, Mn and Pb) on chemical and mechanical properties of special brass. (E25, 2-60; Cu-n, *Zn, Al, Fe, Mn, Pb, Sn*)

173-E. (German.) **Malleable Cast Iron With High Ductility.** A. Hohmann. *Giesserei-Praxis,* no. 24, Dec. 1957, p. 523-524.

Pressure casting in chill molds using graphite carbon. Best results are obtained with Cu content of 0.40-1.20%. (E22r; CI, *Cu,* AD-n32)

174-E. (German.) **Contribution to the Problem of Pinhole Formation in Steel Castings.** R. Radtke. *Giessereitechnik,* v. 8, Dec. 1957, p. 269-272.

Addition of FeO to melt produced pinholes; surface tension, which depends on oxygen content of melt, is important. Other causes.
(E25q, 9-68; ST)

175-E. (German.) **Riser Runner Method for Heavy Castings.** H. Giese. *Giessereitechnik,* v. 8, Dec. 1957, p. 279.

Casting technique demonstrated for 23-ton casting. (E22q; CI)

176-E. (Hungarian.) **Experience in Operation of Basic Cupola Furnaces.** Hungarian Iron Research Institute. *Kohaszati Lapok (Ontöde),* v. 12, Nov. 1957, p. 204-207.

(E10p, W18d; ST)

177-E. (Russian.) **Centrifugal Casting of Bi-Flanged Cast Iron Pipes.** M. M. Levin and V. M. Krapukhin. *Liteinoe Proizvodstvo,* June 1957, p. 1-4.

(E14, 4-10; CI)

178-E. (Russian.) **Production of Cylinder Blocks for Automobiles Using Aluminum Alloy Under Pressure.** T. I. Orlova. *Liteinoe Proizvodstvo,* June 1957, p. 7-8.

(E11, T21b, 3-74; Al)

179-E. (Russian.) **Preparation of High-Density Castings From Remelted Copper Alloys.** A. D. Frolov. *Liteinoe Proizvodstvo,* June 1957, p. 16-18.

Right melting temperature and introduction of deoxidants, such as charcoal and reducing or oxide absorbing slags, is imperative to obtain improved bronze and brass castings. 13 ref.
(E25r; Cu, AD-r, RM-q)

180-E. (Russian.) **Surface Alloying of Die Castings.** A. M. Mikhailov and M. I. Serebryakov. *Liteinoe Proizvodstvo,* June 1957, p. 18-22.

Application of pastes containing powders of ferrochromium and ferromanganese to the mold surfaces and investigation of the penetration depth of Cr and Mn into the casting surface. 7 ref.
(E13, N1e, 5-61; AD-n)

181-E. (Russian.) **Hardening of Sands Containing Water Glass.** A. D. Belov. *Liteinoe Proizvodstvo,* July 1957, p. 1-4.

Composition of sands for steel, iron and bronze castings. Preparation and cure of molds and cores containing water glass.
(E18, E19, E21; ST, CI, Cu-s)

182-E. (Russian.) **Porosity Due to Shrinking in Castings.** I. B. Kumanin. *Liteinoe Proizvodstvo,* July 1957, p. 17-21.

Mathematical representation of rate of cooling of the molds. Direct relationship between casting porosity and the rate of cooling.
(E25n, 2-61, 9-68)

183-E. (Russian.) **Influence of Foreign Inclusions Upon Structure and Properties of Castings.** A. G. Spasskii. *Liteinoe Proizvodstvo,* July 1957, p. 21-25.

Influence of inert impurities such as metallic oxides and silicates upon structures and mechanical properties of Al alloys and bronzes. 11 ref.
(E25q, M27, Q general, 14-68; Al, Cu-s)

184-E.* (Russian.) **Problems on the Theory and Practice of Centrifugal Casting.** B. I. Loshkarev. *Liteinoe Proizvodstvo,* Aug. 1957, p. 1-6.

Results of experimental centrifugal casting of lead-rich bronze. Relationship between quality of the castings and rpm. of the mold, size of the mold, rate of cooling, rate of charging, temperature of the mold, temperature of the alloy and chemical composition. Mechanical properties presented in a tabulated form in relation to each factor. General conclusions on centrifugal casting techniques with emphasis on critical character of the process. 16 ref.
(E14; Cu-s, *Pb*)

185-E. (Russian.) **Improved Technology of Brass Propeller Casting.** K. P. Lebedev, T. N. Vikhoreva and A. I. Veselova. *Liteinoe Proizvodstvo,* Aug. 1957, p. 7-10.

(E general, T22h; Cu-n)

186-E. (Russian.) **Computation of Cooling Rate of Beam Type Castings in Sand Molds.** O. Yu. Kotsyubinskii. *Liteinoe Proizvodstvo,* Aug. 1957, p. 19-22.

(E11)

187-E. (Russian.) **Application of Exothermic Inserts for Head Heating.** E. M. Nosova and I. A. Svidrov. *Liteinoe Proizvodstvo,* Oct. 1957, p. 24-27.

Heating of steel casting heads by means of inserts made of a mixture of powdered Al and oxides brings efficiency of the casting process to 80-90%. (E22n; ST)

188-E. (Russian.) **Properties of Steel Cast Under Vacuum.** V. G. Gruzin and L. L. Gordon. *Liteinoe Proizvodstvo,* Oct. 1957, p. 30-32.

4 ref. (E10, Q general, 1-73; ST)

189-E. (Russian.) **Melting of Ball Bearing Steel in Large Electric Furnaces.** V. M. Sevastyanov. *Metallurg,* v. 2, Oct. 1957, p. 9-10.

Details of the process and comparison of sulphur contents in the metal before and after furnace discharge. (E10, T7d; ST)

F Primary Mechanical Working

55-F. **Impact Extrusion Depth-to-Diameter Ratio is 32:1.** John R. Saul. *American Machinist,* v. 101, Dec. 30, 1957, p. 69-71.

Aluminum rocket tube 8 ft. long extruded and chem-milled.
(F24a, G24b, T2p, 17-57; Al)

56-F.* **Planetary Mill Rolling. Some Practical Aspects.** H. W. Ward. *Iron and Steel,* v. 31, Jan. 1958, p. 25-27.

In 1 sec. no less than 77 pairs of work rolls have each performed a small reduction and in 1 hr. well over a quarter of a million (277,200) light reductions have taken place to produce between 10 and 14 tons of strip. Roll life is remarkably good since each work roll is only in contact with hot steel for about 7% of the time. During the remaining 93% of the time the work roll is revolving around the back-up roll in a deluge of cooling water so that the rolls are kept cool and retain their high surface finish.
(F23, W23k, 1-52; ST, 4-53)

57-F.* **The Planetary Mill and Its Uses.** T. Sendzimir. *Iron and Steel Engineer,* v. 35, Jan. 1958, p. 95-101.

Planetary rolling is "cyclic" rolling or discontinuous rolling, where a roll first enters contact with the unworked portion of the material and then gradually works down, taking a rolling pass along the deformation zone and finally breaking contact with the material at the place where the material has reached its final thickness. (F23, 1-52; ST, 4-53)

58-F.* **Flat Rolling. Effect of Plant Design and Layout on Capital and Operating Costs.** W. F. Cartwright and M. F. Dowding. *Iron and Steel Institute, Journal,* v. 188, Jan. 1958, p. 23-35.

Four typical installations for producing flat rolled products. Qualities and grades of products defined; the use to which the end product is put defines the combination of these. No

(*)Articles Available Through Photocopy Service; See Coupon, p 63.

one plant can produce the full range of qualities; limitations of each. Operating costs of each plant tabulated. (F23, 17-53; ST)

59-F.* **Precision Forging.** H. L. Showalter. *Steel Processing and Conversion,* v. 43, Nov. 1957, p. 615-624, 646.

Vertical and horizontal machines, their forging mechanisms, adjustment and control systems; typical forging cycles, setup practice, temperature control and lubrication of German developed precision forging process; application of hot and cold forging processes. (F22, W22)

60-F. **Finish Rolling of Cast Iron Ways for Machine Tools.** W. Iwascheff. *Western Machinery and Steel World,* v. 48, Dec. 1957, p. 94-95.

(F23q, W25, 17-57; CI)

61-F. **Switch to Forging Beefs Up Products.** Howard E. Jackson. *Western Metalworking,* v. 15, Dec. 1957, p. 52-53.

Forgings replace castings to give strength, toughness to caterpillar rollers at Schmitt Steel Co. (F22n, W22q, 4-51; ST)

62-F. **Lubricants for Wire-Drawing Dies.** W. M. Halliday. *Wire Industry,* v. 24, Dec. 1957, p. 1145-1149, 1153.

Recommendations for die design and requirements for lubricants. (F28h; NM-h)

63-F. (German.) **Precision Steel Pipe—Seamless and Welded.** Eduard Schulte. *Industrie-Anzeiger,* v. 79, Oct. 11, 1957, p. 1245-1246.

(F26; ST, 4-60)

64-F. (Russian.) **Growth of Rolling Mill Production.** B. S. Shapiro. *Stal',* v. 17, Nov. 1957, p. 992-996.

(F23, A4; ST)

65-F. (Russian.) **Tube Industry in the U.S.S.R.** Yu. M. Matveev. *Stal',* v. 17, Nov. 1957, p. 997-1005.

(F26)

66-F. (Russian.) **Wire Production for Industrial Use.** N. I. Kadikov. *Stal',* v. 17, Nov. 1957, p. 1014-1016.

Development of the wiredrawing industry in the U.S.S.R. Its products are used for reinforcing rods in concrete, in the manufacture of bolts, springs and chains. Several research organizations specialize in solving its problems. (F28, 17-57, T7)

67-F. **Foil Laboratory Developments.** *Metal Industry,* v. 92, Jan. 10, 1958, p. 26.

Current developments at Star Aluminium Co., Ltd. (F23; Al, 4-56)

68-F. (French.) **Special Pipe for the Gas Field of Lacq, France.** A. Madrelle. *Corrosion et Anticorrosion,* v. 5, Nov. 1957, p. 327-330.

Steels with high elastic limit are embrittled by the H_2S rich gas of Lacq. Manufacture of pipe and control tests. 6 ref. (F26, Q26s; ST, 4-60)

69-F.* (German.) **Investigation of Rolling Oils and Oil Emulsions in Cold Rolling Test.** Werner Lueg, Paul Funke, Jr., and Winfrid Dahl. *Stahl und Eisen,* v. 77, Dec. 12, 1957, p. 1817-1830. (Henry Brutcher, Altadena, Calif., Translation no. 4100.)

Pure base oils and additions. Testing equipment, measuring methods, materials. Test results: strip thickness, rolling effort, torque and forward slip. Relation between lubricating effect and characteristics. 27 ref. (F23, 1-67, 18-73; ST, NM-h)

70-F.* (Italian.) **Modern Trends in Rolling of Alloy Steels.** N. Cremonese. *Metallurgia Italiana,* v. 49, Nov. 1957, p. 763-773.

Heating equipment, plant layout, types of stands and roll design as influenced by types of shapes required and variety in mechanical properties of alloy steels. (F23, W23; SS, TS)

71-F. (Polish.) **Influence of Rolling Reduction Ratio Upon Quality of Flat Blooms.** W. Leskiewicz. *Hutnik,* v. 24, Sept. 1957, p. 349-355.

Advantages of applying high rolling reduction ratios. Investigation of three different operations with progressively increasing rolling reduction ratios and their influence upon tensile and impact strength of the flat blooms. (F23n, W23a, 4-52)

72-F. (Russian.) **Heating of Alloy Steel Ingots in Recuperative Soaking Pits.** O. A. Semchenko, A. N. Baibuz, N. I. Medvedeva and A. T. Azarov. *Stal',* v. 17, Oct. 1957, p. 915-917.

Investigation of temperature drop along the cross-section of the ingots. Prevention of ingot defect formation due to uneven heat distribution. (F21b, W20g; AY, 5-59)

73-F. (Russian.) **Production of Hot Rolled Plates in High-Alloy X18H25C2 Steel.** V. A. Filonov, F. A. Ksenzuk, V. N. Lola and A. L. Khudas. *Stal',* v. 17, Oct. 1957, p. 917-918.

Composition of the steel, recommended conditions of hot rolling with emphasis on as high a temperature as possible. (F23q, 1-66, 5-53; SS)

74-F. (Russian.) **Technology of Heat Resistant Alloy Rolling.** I. P. Zabaluev, V. I. Travinin and M. A. Kovaleva. *Stal',* v. 17, Oct. 1957, p. 919-923.

Choice of roll calibration. Choice of billet temperature on rolling. Quality control of the alloy. (F23, 2-62; SAG-h)

75-F. (Russian.) **Causes of Wrinkle Formation on Rolling of Round Rods on Heavy Caliber Mills.** S. Z. Yudovich and M. S. Kanev. *Stal',* v. 17, Oct. 1957, p. 924-928.

Proper design of rolls is recommended as a major single contributing factor to prevention of surface defects in rolling. (F23q, W23k, 17-51; ST, 5-55, 9-71)

76-F.* **Influence of Extrusion Variables and Alloying Additions on the Grain-Size and Structural Stability of Extruded Lead.** J. M. Butler. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 145-154.

Influence of extrusion temperature, speed, and extrusion ratio on the grain-size of air-cooled and water-quenched commercially pure Pb rods and pipes. Effect of small additions of Sb, Cu and Sn, and resistance to grain growth at various temperatures of these extruded products. Extrusion temperature has a marked influence on grain size. Small additions of alloying elements diminish the grain size of water-quenched pipe, but their influence on the grain size of air-cooled material is determined by their alloying characteristics. The stability of the extruded structure also shows a dependence on alloying behavior and is related to the original grain size of the alloy. 6 ref. (F24, M27c, 2-60; Pb)

77-F. **Automated Line Adjusts Easily to Design Changes.** R. H. Eshelman. *Iron Age,* v. 180, Dec. 5, 1958, p. 144-146.

Planning and standardized dimension of tubes allow automated line to be modified to meet design changes. (F26p, 18-74)

78-F. **Press-Form Metal Tubing With Simple Dies.** Federico Strasser. *Iron Age,* v. 180, Dec. 12, 1957, p. 127-129.

Basic types of dies and production of short length of tubing from flat pieces of sheet metals. Illustrates variety of closures and cross sections. (F26r, W24n)

79-F. **Technique of Forging.** O. Kienzle and K. Lange. *Metal Treatment and Drop Forging,* v. 25, Jan. 1958, p. 22-24.

Review of 1956 literature. (F22, 10-54)

80-F. **Cold Rolling of Extra-Hard Carbon Steel, and Its Influence on Heat Treatments Involving Quenching.** M. Massin. *Sheet Metal Industries,* v. 34, Dec. 1957, p. 929-940.

8 ref. (F23q, 1-67, 2-64; CN)

81-F. **Swagers Point, Form, Assemble.** *Steel,* v. 141, Dec. 9, 1957, p. 157-160.

Advantages of swaging for internal threading, internal forming, assembling, pointing, tapering and straight reduction on a variety of metal parts. (F25)

82-F. **Fusion Welding in Pipe Fabrication.** W. S. Schaefer. *Welding Engineer,* v. 43, Feb. 1958, p. 34-36.

(F26p; 4-60, ST)

83-F. (German.) **Power Requirement in Drawing of Steel Rod.** L. Möckel. *Fertigungstechnik,* v. 7, Dec. 1957, p. 537-543.

Experimental technique in determination of traction power. The formula of Siebel can be used but theoretical values are lower than the actual ones. The traction power is independent of speed of drawing. (F27, 4-55; ST)

84-F. (German.) **Drawing and Upsetting of Cold Rolled Steel Bars.** Winfrid Dahl and Werner Lueg. *Stahl und Eisen,* v. 77, Dec. 12, 1957, p. 1795-1802.

Review of materials and methods; forces involved. Comparison of test results. Springiness; hardness determinations. 19 ref. (F27, F22j; ST, 4-55)

85-F. (Swedish.) **Economic Considerations in Connection With Machining of Rolls.** Hans Warrol. *Jernkontorets Annaler,* v. 141, Nov. 1957, p. 798-803.

For rolling high-grade steel rod, turned rolls were found economically superior to ground rolls, especially for rolls with high surface hardness. (F23q, W23k, G17a; ST)

G Secondary Mechanical Working

Forming and Machining

75-G. **How Grinding Affects Fatigue Strength.** L. P. Tarasov. *American Machinist,* v. 101, Dec. 30, 1957, p. 72-74.

8 ref. (G18, Q7a; ST)

76-G. **Secondary Broaching.** Ty Miles. *Automatic Machining,* v. 19, Dec. 1957, p. 35-38.

Applications of broaching, a process being more widely used. (G17d; ST)

77-G. **Thread Rolling Fundamentals.** Fred Nell. *Automatic Machining,* v. 19, Dec. 1957, p. 62-64.

(G12; ST)

78-G. **Continuous Wheel Dressing Reduces Downtime in Production Grinding.** *Canadian Metalworking,* v. 20, Dec. 1957, p. 18-19.

Technique involves two recent developments: perpetual form control of grinding wheels using form cutters and cemented diamond particles

(*)Articles Available Through Photocopy Service; See Coupon, p. 63.

in powder metal cutter body.
(G18, G19, 1-61)

79-G. Results of Machining Research on Titanium Alloys. Kenneth Loo. *Machinery,* v. 91, Dec. 13, 1957, p. 1382-1386.

Tests made on two annealed plates of Rem-Cru C-110 M (AMS 4908) Ti alloy in connection with problems of producing large structural members for aircraft, including tapered skin panels. (G17, T24a, 17-57; Ti)

80-G. Turning Operations on High-Temperature Alloys. A. B. Albrecht. *Machinery,* v. 91, Dec. 20, 1957, p. 1431-1434.
(G17a; SGA-h)

81-G. Some Recent Developments in Ultrasonic Machining. *Machinery,* v. 91, Dec. 20, 1957, p. 1443-1444.

Kerry (Ultrasonics), Ltd., has developed a process for cutting internal and external screw threads by ultrasonic vibration. (G24c)

82-G. Quantity Production of Blades for Gas Turbine Compressors. E. Hugh Jones. *Machinery,* v. 91, Dec. 27, 1957, p. 1492-1496.

Methods and machinery for broaching Ti blades and grinding stainless steel blades.
(G17d, G18k, T7h; Ti, SS)

83-G. How to Improve Your Cylindrical Grinding. John A. Mueller. *Machinery,* v. 64, Jan. 1958, p. 129-133.

Basic factors that influence cylindrical grinding and experimental data showing how a change in factors alters end products.
(G18g, 17-52)

84-G. Broaching Internal Helical Gears. Frank Kirsten. *Machinery,* v. 64, Jan. 1958, p. 134-138.
(G17d, T7a; ST)

85-G. Aluminum Cans. *Materials in Design Engineering,* v. 47, Jan. 1958, p. 10-11.

Deep drawing, impact extrusion and conventional techniques.
(G4b, G5; Al)

86-G. Production Research in Metal Cutting. M. Eugene Merchant. *Mechanical Engineering,* v. 79, Dec. 1957, p. 1137-1141.

Study of machining forces and tool wear. 5 ref. (G17, Q9, T6n)

87-G. And Now, Digital Flame Cutting! *Metalworking Production,* v. 101, Dec. 6, 1957, p. 2177-2179.

Computer-controlled flame cutting machine cuts time and costs in producing profiled plates for ship construction.
(G22g, W29d, 1-61, 18-74; ST)

88-G. Brake-Welder Team Form Stainless Pipe. *Modern Industrial Press,* v. 19, Dec. 1957, p. 23-24.
(G3n, K general, 4-60; SS)

89-G. Titanium Problem Licked by New Hot Spinning Process. *Modern Metals,* v. 13, Dec. 1957, p. 66-67.
(G13, 1-66, T24e; Ti)

90-G.* Titanium Forming. Bill Payne. *RPI Engineer,* v. 10, Jan. 1957, p. 20-23.

Experience with 6Al-4V Ti alloy; best conditions and methods for die, draw bench, roll, hammer, brake forming, spinning operations.
(G general; Ti)

91-G.* Modern Presswork Techniques. T. G. Woodward. *Sheet Metal Industries,* v. 34, Nov. 1957, p. 803-812.

Important factors in design of experimental tooling and strip layout in developing sequence of operation and tools for multi-stage presswork. Technique creates components in strip material while retaining it in strip form in order to progress through various stages of the tools. (G1)

92-G. Need for Specific Sheet-Metal Testing Methods for Deep Drawing and Forming. G. de Witte. *Sheet Metal Industries,* v. 35, Jan. 1958, p. 19-22.
(G4b, Q23q, S general, 4-53)

93-G. Ejection and Handling of Large Components in Pressworking. J. H. Stephens. *Sheet Metal Industries,* v. 35, Jan. 1958, p. 23-34, 54.

Press layout, production costs, conveyors, loaders, the "iron hand", and automation equipment for various types of dies. (G1, W12)

94-G.* Photoetching Forms Thin Parts. *Steel,* v. 141, Nov. 18, 1957, p. 153-156.

Photoetching, in which patterns are printed on coated metal sheets and strips and unwanted portion etched away with acid used for accurately producing thin metal parts. Carbon and stainless steels, Cu, Ni and Al alloys are readily etched. Advantages of process. (G24b)

95-G.* Residual Stresses From Machining Operations. Pt. 1. Erik K. Henriksen. *Steel Processing and Conversion,* v. 43, Nov. 1957, p. 633-635, 639-640, 641.

Reviews literature on residual stresses produced by machining operations. Forces developed between tool chip and workpiece in the mechanism of stress formation. Machining stress data with single-point tools for carbon steels relating machining stress with rake angle and carbon content. Effect of speed and direction of cut on stress accumulation. (To be continued.)
(G17, Q25h)

96-G. Cutting Material and Machining Costs With Power Roll Forming. E. W. Bartle. *Tool Engineer,* v. 39, Nov. 1957, p. 107-110.

Power roll forming is a cold rolling process in which material in a blank is caused to flow over rotating mandrel. Series 300 and 400 stainless steels, low-carbon steels, Ni, Ti and Al alloys successfully roll formed; application of process. (G11)

97-G. Solving Machining Problems With Chemical Milling. Arthur Colton. *Tool Engineer,* v. 40, Jan. 1958, p. 119-124.
(G24b)

98-G. Electrical Discharge Machining of Superalloy Turbine Rotor Blades. D. J. MacLean. *Western Machinery and Steel World,* v. 48, Dec. 1957, p. 77-82.

New method of working alloys above normal machining range.
(G24a, T2p; SGB-q)

99-G. Machinability of Cold Drawn Steel Bars. Fred J. Robbins. *Western Metalworking,* v. 15, Dec. 1957, p. 47-49.

Effects of machinability in both metallurgical and mechanical aspects. (G17k, Q general; 4-55, ST)

100-G. (German.) **Deep Drawing of Stainless Chromium and Chromium-Nickel Steels.** Georg Menges and Bernhard Vogelsang. *Industrie-Anzeiger,* v. 79, Aug. 27, 1957, p. 47-52.

Theoretical analysis supported by technical data. 10 ref.
(G4b; SS, *Cr, Ni*)

101-G. (German.) **Manufacture of Precision Slide Bearings.** *Technica,* v. 6, Aug. 16, 1957, p. 885-890.

Surface machining necessary to achieve the best characteristics for various bearings. (To be continued.)
(G19, T7d)

102-G. (Italian.) **Cold Bending of Sheet.** P. I. Sandro Spiriti. *Macchine,* v. 12, Nov. 1957, p. 1111-1115.

Formulas for obtaining desired bends; examples. (G6, 4-53)

103-G. (French.) **Surface Phenomena in Drawing Steels Made in Openhearth and Electric Furnaces.** Maurice Vazelle. *Métaux, Corrosion, Industrie,* no. 385, Sept. 1957.
(G4; ST)

104-G. (German.) **Productivity and Economy in Metal Chipping.** E. Hirschfeld. *Fertigungstechnik,* v. 7, Aug. 1957, p. 345-348.

Amount of surface machined; cutting speed; feed; suitable carbides.
(G17, T6n; 6-69)

105-G. (German.) **Liquid Honing Under Pressure.** F. Neuberger, L. Mockel and L. Rötz. *Fertigungstechnik,* v. 7, Sept. 1957, p. 413-416.

Method is recommended for die finishing, scouring and polishing. 6 ref. (G19n, W24n)

106-G. (German.) **Use of Diamond Grinding Wheels.** *Metallwaren-Industrie und Galvanotechnik,* v. 48, Sept. 1957, p. 391-394.

Bonding; proper uses; handlapping. (G18, 1-52; NM-k37)

107-G. (German.) **Advantages and Disadvantages of Turning and Grinding the Grooves in the Rolls of Wire Rod Mills.** Torsten Palm and Hans Warrol. *Stahl und Eisen,* v. 78, Jan. 9, 1958, p. 35-39.

Life of turned and ground rolls. Economic problems in machining rolls. (G17a, G18, W23k)

108-G. (Russian.) **Increase of Finishing Deformation Temperature as Means for Decreasing Load When Stamping Large Billets.** A. V. Altykis and N. I. Belan. *Metallovedenie i Obrabotka Metallov,* Oct. 1957, p. 48-52.

Temperature increase of the billet at the end of stamping from 850 to 1050° C. allows decrease of the load approximately by one half.
(G3, 2-61; ST, 4-52)

109-G. (Russian.) **Production Problems of Automobile Sheet Steel for Deep Drawing.** G. D. Rogoza. *Stal',* v. 17, Oct. 1957, p. 941-943.

Non-aging killed steel is recommended for sheet making with sheet hardness control. 5 ref.
(G4f, I'21a; ST-c)

110-G. (Russian.) **Boring Heat Resistant Steel With Electropolished Bits.** V. V. Monakov. *Vestnik Mashinostroeniya,* v. 37, Sept. 1957, p. 46-47.

Effect of internal surface cleanliness of perforated heat resistant steel workpieces. 5 ref.
(G17g, T6n; SS)

111-G. How to Machine Difficult Workpieces. Pt. 1. C. R. Stroup. *American Machinist,* v. 102, Jan. 13, 1958, p. 106-109.

Basic principles, operating techniques and latest advice on applications of electrolytic grinding.
(G18, G24d)

112-G. Form Thick Titanium Spheres by Hot Spinning. *Iron Age,* v. 180, Dec. 5, 1957, p. 142-143.
(G13, 1-66, T24d; Ti)

113-G. Fast, Accurate Band Machining Avoids Chip Waste. *Iron Age,* v. 180, Dec. 26, 1957, p. 49-51.

Advantages of cutting, slotting, and shaping with band sawing machines. (G17h)

114-G. Forming Magnesium Skin Panels for Aircraft. H. F. Young. *Machinery,* v. 91, Nov. 8, 1957, p. 1105-1107.
(G4d, T24a, W24g; Mg)

115-G. Production of Aircraft Structural Shapes by Hot Stretching. B. Maloney. *Machinery,* v. 91, Nov. 8, 1957, p. 1107-1108.

(G9, T24a; Al)

116-G. Quantity Production of Fasteners. *Machinery,* v. 91, Nov. 22, 1957, p. 1214-1218.

Blanking, heading, pointing, thread-rolling, thread-grinding and hardening processes are employed in production of steel, brass and aluminum fasteners.

(G general, T7f; ST, Al, Cu, *Zn*)

117-G. Production of Integrally-Stiffened Panels for the Vanguard Airliner. *Machinery,* v. 91, Nov. 29, 1957, p. 1244-1253.

Methods and equipment for pressing curvature, shot peening and milling panels.

(G4d, G17b, G23n, T24a; Al)

118-G. Turning Operations on High-Temperature Alloys. A. B. Albrecht. *Machinery,* v. 91, Dec. 20, 1957, p. 1431-1434.

(G17a; SGA-h)

119-G. Some Recent Developments in Ultrasonic Machining. *Machinery,* v. 91, Dec. 20, 1958, p. 1443-1444.

Kerry (Ultrasonics), Ltd., has developed a process for cutting internal and external screw threads by ultrasonic vibration. (G24c)

120-G. Production Research in Metal Cutting. M. Eugene Merchant. *Mechanical Engineering,* v. 79, Dec. 1957, p. 1137-1141.

Advantages of unified study of fundamental application of metallurgy, physics, dynamics, physical chemistry and engineering techniques and concepts of metal cutting research. 5 ref. (G17, A9m)

121-G. Inert-Gas Welding Gun Cuts, Then it Welds. *Metalworking,* v. 14, Jan. 1958, p. 3-5.

Trailer manufacturer finds method gives square cut edges at high speed. Eliminates preparation before welding Al plates and frame members. (G22, K1d, 1-52; Al)

122-G. Prestress Raises Steel Performance to New High. *Metalworking,* v. 14, Jan. 1958, p. 10-11.

Increased tensile strength and fatigue life of steel bomb rack hook used in jets.

(G23q, Q27a, Q7b, T2k; ST)

123-G.* Speed Effects in Deep Drawing. H. T. Coupland and D. V. Wilson. *Sheet Metal Industries,* v. 35, Feb. 1958, p. 85-103.

Effects of variations in drawing speed on performance in cup drawing using two distinct punch forms. Behavior of deep drawing quality mild steel and 70-30 brass. Lubricants have been confined to a series of mineral oils and colloidal graphite. (G4b; CN, Cu-n, NM-h)

124-G. Short Run Dies Offer Long Life. *Steel,* v. 141, Dec. 2, 1957, p. 94-96.

Advantages of low-cost dies for blanking, punching, piercing and forming operations. (G3, W24n)

125-G. Chem-Milling Handles Tough Job. *Steel,* v. 141, Dec. 2, 1957, p. 114.

Controlled chemical milling produces complex parts. (G24b, T24a)

126-G. Electrolytic Machining Handles Tough Alloys. *Steel,* v. 141, Dec. 9, 1957, p. 196-200.

(G24d; Co, Ni, SS)

127-G. Case of Molybdenum Disulfide. Harry Simon. *Steel,* v. 141, Dec. 30, 1957, p. 68-69.

Molybdenum disulphide used as a lubricant in tight-fitting assemblies and for lubricating hot drawing and forming dies. (G1, G4, Q9; Mo, NM-h)

128-G. In-Plant "Diamond Mines" Are Expensive—Spot Yours and Save. Carol E. Reuss. *Tooling and Production,* v. 23, Feb. 1958, p. 67-78.

Comprehensive guide to the basic principles of abrasive and diamond wheels; optimum feeds and speeds; comparison with electrolytic, electrospark and ultrasonic grinding; diamond salvage techniques; applications of finish to carbide tools. (G18, 1-52; NM-k37)

129-G. A Cold Answer to Some "Hot" Metal Problems. C. E. Ricketts. *Tooling and Production,* v. 23, Jan. 1958, p. 78-81.

A new high-frequency impact-spin technique for cold dimpling of superalloys. Advantages compared to conventional ram-type dimpling process. (G3, 1-67; Ti, SGA-h)

130-G. Carbide Milling of Steel on Low-Horsepower Machines. Raymond E. Novkov and William B. Stein. *Tooling and Production,* v. 23, Feb. 1958, p. 83-87.

Relative horsepower requirements for various chip loads. (G17b, W25r)

131-G. Factors That Affect the Performance of Coated Abrasives. S. L. Johnson. *Tooling and Production,* v. 23, Jan. 1958, p. 87-90.

Effects of speed, contact, wheel shape and hardness, grit size and type and grinding pressure on the finish obtained with abrasive belt grinding. (G18, 1-52; NM-j)

132-G. Subzero Temperatures Facilitate Production Processes. Robert A. Wason. *Tool Engineer,* v. 40, Feb. 1958, p. 107-115.

Chilling workpieces or coolants reduces cutting time, facilitates machining and improves tool life. New techniques can stabilize and improve metallurgical properties, are valuable also in processing rubber and plastics. (G17, 1-67, 2-63)

133-G. Modern Tube Bending Equipment. G. E. Hart. *Welding and Metal Fabrication,* v. 25, Oct. 1957, p. 392-393.

Fundamental forms of tube bending equipment including forming dies, clamps and mandrels.

(G6, 1-52; 4-60)

134-G. Grinding Wheels for Aluminum. Arthur T. Dalton. *Welding Engineer,* v. 43, Feb. 1958, p. 44.

(G18; 1-52; Al)

135-G. (French.) **Technology of Cold Forming of Metals. Pt. 2.** R. Molle. *Metallurgie et la Construction Mécanique,* v. 89, Dec. 1957, p. 1021-1027.

Roll forming, deep drawing: techniques, equipment, applications. (Concluded.) (G4b, G11)

136-G.* (French.) **Machinability of Steels.** E. Bodart. *Revue de la Mécanique,* v. 3, Oct. 1957, p. 125-139.

Methods of determining machinability; measurement of tool life gives results most directly transposable to shop; experimental results obtained by tool life method. No simple correlation is found between any given steel manufacturing process or condition and machinability. 11 ref. (G17k; ST)

137-G. (German.) **Features of Development of the Superfinishing Process.** K. Wieck. *Das Industrieblatt,* v. 57, Aug. 1957, p. 396-399.

Development of oscillating superfinishing machines. (G19q, 1-52)

138-G. (German.) **Electro-Erosion Apparatus.** G. Barna. *Fertigungstechnik,* v. 7, Dec. 1957, p. 543-549.

Some theories on electro-erosion; design variants in apparatus, their advantages and disadvantages; technology of hard metal coating. (G24a, 1-52, L24)

139-G. (German.) **Scraping of Tooth Profiles. Pt. 2.** G. Rippin and H. Theumer. *Fertigungstechnik,* v. 7, Dec. 1957, p. 569-572.

Experiments with milling and scraping; scraping improves toothwork whereas grinding can interfere; control and the importance of coolants. (G17b; NM-h)

140-G. (Japanese.) **Study on High-Speed Machining. Pt. 8. Effect on Tool-Chip Contact Area on Tool Life.** Hidehiko Takeyama and Eiji Usui. *Journal of Mechanical Laboratory,* v. 11, Nov. 1957, p. 185-188.

At the optimum tool-chip contact area per unit area of cut, the cutting speed can be increased up to 140%. 6 ref. (G17, 3-68)

141-G. (Japanese.) **Study on High-Speed Machining. Pt. 9. Effect of Tool Cutting Conditions on Machining Performance.** Hidehiko Takeyama and Eiji Usui. *Journal of Mechanical Laboratory,* v. 11, Nov. 1957, p. 189-193.

Variation of tool-chip contact area is independent of coefficient of friction of rake face. The contact area is influenced by the metallic affinity between the rake face and the chip. (G17, Q9p)

142-G. (Swedish.) **Turning or Grinding Roll Grooves.** Torsten Palm. *Jernkontorets Annaler,* v. 141, Nov. 1957, p. 790-797.

From point of view of rolling time before rejection there is no difference between turning and grinding of roll grooves on chilled rolls. (G17a, G18, W23k; ST)

143-G. (Swedish.) **Chemical Treatment of Metals.** *Teknisk Tidskrift,* v. 87, Oct. 8, 1957, p. 839-842.

Chemical cutting and punching method; preparation, masking, etching and post-treatment. Economic aspects. 5 ref. (G24b; Al)

H Powder Metallurgy

36-H. High Heat Resisting Aluminum. R. Irmann. *Canadian Metalworking,* v. 20, Dec. 1957, p. 38-39.

Properties and other qualities of sintered Al powdered metal.

(H general, Q general; Al, SGA-h)

37-H. Magnetic Tape Rolled From Powdered Metals. C. E. Richards. *Electrical Manufacturing,* v. 60, Dec. 1957, p. 104-109.

Production of magnetic alloy strip by sintering mixed powders and cold rolling the billets. 7 ref.

(H14j; SGA-n)

38-H.* Copper-Silica and Copper-Alumina Alloys of High-Temperature Interest. Klaus M. Zwilsky and Nicholas J. Grant. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1197-1201.

Alloys containing up to 10 Vol. % of oxide were made by utilizing relatively coarse Cu powders and several sizes of silica and alumina powders. The alloys were prepared by mechanical mixing of powders followed by cold hydrostatic pressing, sintering and hot extrusion.

(H general; Cu, *Al, Si,* SGA-h)

39-H. Report on Powder Metallurgy in the U. S. S. R. Henry H. Hausner. *Metal Progress,* v. 73, Jan. 1958, p. 105-108, 196.

"Self criticism", Russian style, of the knowledge and practice of powder metallurgy as of 1953, calls at-

(*)Articles Available Through Photocopy Service; See Coupon, p. 63.

tention to deficiencies in meeting the aims of the last five-year plan. Indications in subsequent literature show that many of these deficiencies are being rapidly corrected.
(H general)

40-H.* **Making Strip Metal From Metallic Powder.** William N. Hayden, John D. Shaw and Walter V. Knopp. *Precision Metal Molding,* v. 16, Jan. 1958, p. 48.

Powder is fed to a rolling mill where it is compacted to less than full density, but into strip strong enough to be handled. From the mill, it may be rolled into coils for batch annealing, or may be fed directly onto the belt of a continuous sintering furnace. The operations which follow sintering, such as annealing, and cold or hot re-rolling, etc., adhere to standard practices. (H14j, H15)

41-H. **How to Give Powdered Metals Strength.** *Steel,* v. 141, Nov. 25, 1957, p. 110-114.

Iron or steel powdered compacts are infiltrated with melted copper. Data on heat treatment and physical properties. (H16e; Fe, ST, *Cu*)

42-H. (German.) **Production of Large Hard Metal Rings and Other Products by Sintering.** E. Bryjak and W. Missol. *Fertigungstechnik,* v. 7, Dec. 1957, p. 557-561.

Values for the density and the hardness comply with data in literature. (H14, Q29n, P10a)

J Heat Treatment

73-J.* **Dependence of Decarburization on Rate of Graphitization in Whiteheart Malleable Iron.** C. T. Moore. *British Cast Iron Research Association, Journal of Research and Development,* v. 7, Dec. 1957, p. 82-94.

Apparatus capable of continuously recording the weight changes of malleable irons during decarburization in a gaseous atmosphere. The rate of decarburization is decreased when graphitization of eutectic cementite occurs, although the effect is slight in balanced sulphur irons. Evidence suggests that during the later stages of annealing the solution rate of graphite is a controlling feature of the decarburization process particularly in excess sulphur irons. 5 ref. (J23, J4a, N8s; CI-s)

74-J. **Applications of Furnace Atmospheres. Pt. 2.** C. E. Peck. *Industrial Heating,* v. 24, Dec. 1957, p. 2486-2492.

Types of atmospheres employed in hardening treatments for ferrous metals. (To be continued.)
(J2k; ST)

75-J.* **Effect of Heat Treatment on the Hardness and Microstructures of U-Ti Alloys.** David L. Douglass and Lyle L. Marsh, Jr. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1260-1267. (CMA)

Wide variations in the hardness and microstructure of U-Ti alloys (8.5, 25.5 and 50 at. % Ti) may be effected by suitable heat treatments, especially quench-temper and isothermal transformation. Slow-cooled specimens were softer and there were no great changes with Ti content. Hardness achieved by quenching from the $\beta + \varepsilon$, $\gamma + \varepsilon$ and γ fields are compared. Shattering occurred on quenching from the γ field because of the volume changes attendant on U_2Ti. High hardness resulted when alloys were quenched from regions where U_2Ti is stable. 4 ref. (J26, Q29n, M27; U, *Ti*)

76-J.* **Tool Steels in Service. Pt. 2. Practical Aspects.** A. P. T. Taylor-Gill. *Iron and Steel,* v. 31, Jan. 1958, p. 19-24.

Methods whereby distortion and size changes can be held at a minimum. Suitable austenitizing temperatures for commonly used tool-steels are 770° C. for plain high-carbon, 820° C. for plain 0.60 C steel, 800° C. for 1% C 1% Mn-Cr-W type oil hardening steel, 1030° C. for 2% C high-carbon, high Cr and 5% Cr-Mo steels, 1050° C. for 5% Cr-Mo-W steels, and 10% W types. 9 ref. (J22; TS, 9-74)

77-J. (Japanese.) **Heat Treatment of Magnesium-Zinc-Zirconium Alloy.** Shotaro Morozumi and Tomoyuki Takeuchi. *Light Metals* (Tokyo), v. 7, Nov. 1957, p. 73-81.

8 ref. (J general, 2-60; Mg, *Zn, Zr*)

78-J.* **Controlling Carburized Case Depth.** R. L. Suffredini. *Materials in Design Engineering,* v. 47, Jan. 1958, p. 118-119.

Quality control of carburized parts can be achieved by rapid nondestructive hardness testing. Effects of the case depth and various hardening treatments on the resulting hardness values are outlined and correlation is obtained by making a superficial Rockwell determination, sectioning the sample and determining the case depth by microscopic examination. (J28g, Q29)

79-J. **Quenching Oil Does Make a Difference.** Chris Hendra. *Metalworking Production,* v. 101, Nov. 29, 1957, p. 2138-2139.

How properties of quenching oil relate to operations in use and kinds of work being processed.
(J26n, W28p; ST)

80-J. **Heat Treating. An Important Step in Punch and Die Manufacture.** Joseph H. Bockrath. *Tool Engineer,* v. 39, Dec. 1957, p. 96-100.

(J general, W24n, W24p)

81-J. (French.) **Heat Treatments by High Frequency Induction.** *Machine Moderne,* v. 51, Nov. 1957, p. 38-40.

Capacity and induction heating are used to produce superficial hardening of tools and continuous quenching. Description of the process. 6 ref. (J2g; ST)

82-J. (German.) **Heat Treatment for Steel Castings.** A. Hohmann. *Giesserei-Praxis,* v. 75, Oct. 1957, p. 453-456.

Metallurgical properties, especially chemical composition, determine the proper heat treatment.
(J general; ST, 5-11)

83-J. (German.) **Heat Treatment Technique for Machine Steels.** H. Schultz-Balluff. *Industrie-Anzeiger,* v. 79, Aug. 27, 1957, p. 42-47.

Best technique for hardening and case hardening steel. (J26, J28; ST)

84-J. (German.) **Contemporary Aviation Steels and Their Heat Treatment.** Heinz Kiessler. *Schweizer-Archiv,* v. 23, Sept. 1957, p. 304-310.

Properties and heat treatment of various types of steel used in the German aircraft industry.
(J general, Q general, T24, 17-57; ST)

85-J. (Russian.) **Carbon Content of Steels Subjected to Carburizing.** S. S. Ermakov. *Metallovedenie i Obrabotka Metallov,* July 1957, p. 43-45.

The maximum carbon content of case hardened steel parts, which are subjected to repeated dynamic loading, should not exceed 0.20-0.23%. 4 ref. (J28, 2-60; ST)

86-J. (German.) **Induction Heating in the Processing of Tungsten.** H. Herklotz. *Fertigungstechnik,* v. 7, Sept. 1957, p. 400-402.

Economy lies in the omission of heating-up periods. Crystal structure depends upon temperature and heating time; optimum is achieved with high-frequency current at 1850° C. (J2g; W)

87-J. (German.) **Surface Treatment of Gray, Temper and Steel Castings With Medium Frequency Induction Heating.** G. Hoffmann. *Fertigungstechnik,* v. 7, Sept. 1957, p. 403-407.

(J2g; CI-n, CI-s, ST)

88-J. (German.) **Comparison Between Processes of Wire Patenting.** Erich Jaenichen, Klaus Schlegel, Franz Greis, Hans Krautmacher and Wilhelm Püngel. *Stahl und Eisen,* v. 77, Dec. 12, 1957, p. 1802-1817.

Effects of electric resistance patenting on properties of steel containing 0.35-0.95% carbon. Testing wires patented by electric resistance and Pb after heating in gas-fired continuous furnaces. (J25, 4-61; ST)

89-J. (Russian.) **Influence of Carbon Upon Endurance Limit of Carburized Steel.** I. D. Rybasenko. *Metallovedenie i Obrabotka Metallov,* Oct. 1957, p. 19-21.

1.1% of carbon in the diffusion layer of the carburized steel is the upper limit above which the endurance limit of the steel falls will be impaired. 3 ref. (J28g, Q7a; ST)

90-J. (Russian.) **Surface Hardening of Carbon Steel by Gas Carburization.** O. K. Kotov. *Metallovedenie i Obrabotka Metallov,* Oct. 1957, p. 28-33.

3 ref. (J28g; CN)

91-J. (Russian.) **Industrial Application of Gas Cyaniding.** B. A. Stetsenko. *Metallovedenie i Obrabotka Metallov,* Oct. 1957, p. 43-48.

Gas cyaniding of gears. 4 ref.
(J28j, T7a; ST)

92-J. (Russian.) **Prevention of Decarburization of Alloy Steel on Annealing in Protective Atmosphere.** K. V. Dneprenko and M. M. Ioffe. *Stal',* v. 17, Oct. 1957, p. 934-935.

Protective atmosphere saturated with benzol or passed through hot charcoal practically eliminates decarburization of steel on annealing.
(J4a, J23, J2k; AY)

93-J. **Application of Furnace Atmospheres. Pt. 1. Atmospheres for Brazing and Sintering and for Nonferrous Heat Treatments.** C. E. Peck. *Industrial Heating,* v. 25, Jan. 1958, p. 56-64.

(J2k, K8, H15q, 1-52)

94-J. **Heating of Steel for Working and Treatment.** F. C. Bird. *Metal Treatment and Drop Forging,* v. 25, Jan. 1958, p. 13-21.

Methods of heating, types of fuel, furnaces, combustion conditions, heat transfer, temperature control, insulation, relative efficiency and comparative cost. 8 ref. (J general, F21, 1-55, ST, RM-j, RM-k, RM-m)

95-J. **Modified Martemp Cuts Warping.** Edgar C. Wallace and Howard E. Crouse. *Steel,* v. 141, Dec. 2, 1957, p. 97-98.

Switching to controlled atmosphere furnace and martempering at 275° F. eliminated warping and stabilization difficulties for pump blocks made of 52100 steel or stainless steel.
(J26p, J2k; ST, SS)

96-J. **New Way to Measure Quenching Speed.** E. A. Bender and H. J.

Gilliland. *Steel,* v. 141, Dec. 30, 1957, p. 56-59.
(J26, X13, W28p; ST)

97-J.* (French.) **Structural Hardening of Some Copper Alloys.** J. Schoofs. *Revue Universelle des Mines,* v. 13, Dec. 1957, p. 699-707.

Theory of structural hardening; heat treat conditions and phenomena occurring during hardening of a dozen alloy combinations, including Cu-Cr and Cu-Be systems as well as lesser known ternary and quaternary systems; mechanical properties and applications of these alloys. 9 ref. (J general, N6, N9, Q general, 17-57; Cu, *Cr, Be*)

98-J. (Hungarian.) **Causes of Changes in the Dimensions of Hardened Steel.** Zoltan Csepiga. *Kohaszati Lapok,* v. 12, Nov. 1957, p. 465-469.

Dimensional changes during transformations induced by heating.
(J general, P10d; ST)

K Assembling and Joining

113-K. Welding Applied to Diesel Locomotive Construction. K. S. Black. *Australasian Engineer,* v. 50, Oct. 8, 1957, p. 72-76.
(K general, T22n)

114-K.* Induction Soldering and Welding. Fritz Alf. *AEG Progress,* v. 3, 1957, p. 105-109.

Principles, technique, applications.
(K6n, K7e, K8k)

115-K. Five Variations of Inert Arc Welding. *Industry and Welding,* v. 30, Dec. 1957, p. 46-47, 80-81.

Methods used to weld Al fuel tanks at Evans Reamer and Machine Co. (K1d; Al)

116-K. Can You Weld Chromized Parts? *Industry and Welding,* v. 30, Dec. 1957, p. 50-51, 55.
(K1d; ST, *Cr,* 8-74)

117-K.* Adhesives for Metals. A. E. Williams. *Iron and Steel,* v. 31, Jan. 1958, p. 11-14.

A film of adhesive between two metal surfaces comprises the adhesive-bonded joint, and any stresses in the component are transferred to this film so that the area of metal covered by the film has to be sufficiently large to permit the full load to be transmitted without unduly stressing the film. Experience shows that these requirements are best met by using a lap joint or a modification of this. (K12)

118-K. Welding and Brazing of Precipitation-Hardening Steel. F. K. Lampson. *Machine Design,* v. 29, Dec. 12, 1957, p. 180-182.
(K1d, K8; SS)

119-K. High-Speed Methods Weld to Aircraft "Specs". Gordon Parks. *Metalworking Production,* v. 101, Nov. 22, 1957, p. 2088-2092.

Inert-gas automatic welders speed production at Solar Aircraft Co. Improves quality of weld by regulating feed wire. (K1d, T24b, 1-52; SS, Ti)

120-K. "Squirt Gun" Welds Dissimilar Metals. A. R. Kemerer. *Metalworking Production,* v. 101, Dec. 13, 1957, p. 2220-2221.

Diaphragms for multistage steam turbines are squirt welded with 18-8 stainless steel wires and chromium-enriched flux. (K1e; SS, RM-q)

121-K. Dip Brazing Magnesium. William J. Graves. *Modern Metals,* v. 13, Jan. 1958, p. 40-42.

Two Mg alloys have been successfully brazed, M1A and AZ31B (FSI). The most satisfactory brazing filler alloy has been found to be AZ125. Dow brazing flux No. 452 has given the best results with this filler alloy in the manufacture of wave guide parts. (K8n, Mg, SGA-f)

122-K. Ultrasonic Welding. T. W. Black. *Tool Engineer,* v. 39, Dec. 1957, p. 111-113.
(K6, 1-74)

123-K. CO_2 Welding of Steel. R. W. Tuthill. *Tool Engineer,* v. 40, Jan. 1958, p. 82-86.
(K1d; ST)

124-K. Factors That Shape the Weldability of Aluminum Bus. *Welding Engineer,* v. 42, Nov. 1957, p. 39-42.

Characteristics of Al alloys and their influence on weldability; practices in welding Al bus bars.
(K general, K9s; Al)

125-K. Dip Brazing Magnesium Eliminates Shrinkage Warpage Problems. William J. Graves. *Western Metalworking,* v. 15, Dec. 1957, p. 50-51.
(K8n; Mg)

126-K. (Dutch.) **Welding Technique in the Metal Industry.** F. L. Harteng. *Lastechniek,* v. 21, Dec. 1957, p. 295-303.

Consideration of welding in metal processing and as a technique in the joining of metals. Division of welding into its components. Seven diagrams designed to facilitate the solution of joining problems.
(K general)

127-K.* (German.) **Physics of Pressure Welding.** Frederich Erdmann-Jesnitzer. *Aluminium,* v. 33, Nov. 1957, p. 730-739.

Theory and practical results in welding two pieces of metal, influenced by pressure, temperature and time. Welding without formation of a liquid phase; sintering, cladding, formation of built-up edges on tools in machining, interactions in welding and wear, effects of temperature and time in welding of plastics and glass melting. 20 ref.
(K5, L22)

128-K. (German.) **Welding and Cutting.** Bruno Waeser. *Chemiker-Zeitung,* v. 81, Sept. 20, 1957, p. 612-615.

Theoretical discussion, dealing particularly with corrosion phenomena. 8 ref. (K general, G22, R general)

129-K. (German.) **Modern Adhesives, Especially Epoxyd-Resins.** W. Schäfer. *Feingerate Technik,* v. 6, Sept. 1957, p. 390-393.
8 ref. (K12, NM-d34)

130-K. (German.) **Application of Adhesion Technique in Precision Tool Manufacturing.** L. Schreiner. *Feingerate Technik,* v. 6, Sept. 1957, p. 393-397.

Examples of versatility of epoxyd-resin in applications in vacuum technique, electrotechnics, optics and supersonics. (K12, NM-d34)

131-K. (German.) **Warping of Cylindrical Structures by Internal Stresses Caused by Welding.** F. W. Bornscheuer. *Schweissen und Schneiden,* v. 9, Nov. 1957, p. 492-494.
5 ref. (K general, Q25h, 7-51)

132-K. (German.) **Welding in the Vacuum Technique.** Werner Espe. *Vakuum-Technik,* v. 6, Aug. 1957, p. 91-98.

Examination of welding methods tested and approved in the high-vacuum technique, especially in fabrication of high-vacuum and gas-discharge tubes. (To be continued.)
(K general, 1-73)

133-K. (Italian.) **Applications of Resistance Welding.** Oscar Grossi. *Macchine,* v. 12, Nov. 1957, p. 1057-1069.

Applications, techniques in fields of automotive vehicles, bicycles, motorcycles, electrical equipment, light-weight boiler elements, railroad equipment, steel industry, with numerous illustrations of equipment for specific jobs. (K3)

134-K.* (French.) **Applications of Welding in the Construction of Stainless Steel Railway Cars.** M. Thomas. *Soudage et Techniques Connexes,* v. 11, Nov-Dec. 1957, p. 345-351.

Because of its physical and mechanical properties, 18-8 type stainless is no more costly for railway car construction than ordinary steel and permits saving of 33% in weight. Sub-assemblies are prepared from bent and drawn components, welded mainly by spot, seam and double-spot welding processes. Details of equipment, fabricating principles.
(K3n, T23p, 17-57; SS)

135-K.* (French.) **Some Resistance Welding Applications in the Field of Metal Framework Construction.** J. M. Labessoulhe. *Soudage et Techniques Connexes,* v. 11, Nov-Dec. 1957, p. 356-367.

Principles, advantages of spot welding; welding machines capable of assembling on an industrial basis two thicknesses of 25 mm., or three thicknesses of 20 mm.; examples of light-weight frame structures.
(K3n; ST, SGB-s)

136-K.* (French.) **Metallurgy of Welding Certain Austenitic Heat and Corrosion Resistant Alloys.** Anthony H. Waterfield and Russel P. Culbertson. *Soudage et Techniques Connexes,* v. 11, Nov-Dec. 1957, p. 373-380.

Metallurgical properties of three corrosion resistant alloys (Ni-Mo, Ni-Mo-Cr, Ni-Mo-Cr-Fe) and three heat resistant alloys (Ni-155, Co-W-Ni-Cr, Ni-Cr-Mo-Fe) in light of their effect on 'welding techniques required. Methods available for stainless steel can be used provided proper precautions are observed.
(K general, K9; SS, SGA-g, SGA-h)

137-K. (French.) **Welded Framework for G2 an G3 Nuclear Reactors at Marcoule.** J. Doat. *Soudage et Techniques Connexes,* v. 11, Nov-Dec. 1957, p. 391-396.

Framework of two buildings, each housing one reactor, consists of six box-shaped, articulated portal frames fabricated from 37/44 openhearth steel plate welded by semi-automatic submerged arc techniques. Details of shop and site work.
(K1e, W11p, 17-57; ST, 4-53)

138-K. (German.) **On the Evaluation of Defective Welds Through X-Ray Examination and Fatigue Tests.** Hermann Möller and Max Hempel. *Archiv für das Eisenhüttenwesen,* v. 28, Sept. 1957, p. 531-541.

Results of fatigue tests compared to those from perfect welds. Porous welds, welds with slag enclosures and with stringer-type structures in the sheet metal showed the same fatigue properties as the specimens with perfect welds. Thus minor internal defects are negligible in acceptability criteria for welds. This contradicts common practice. Only defects in the boundary between workpiece and weld are of serious consequence. 13 ref.
(K9r, Q7a; ST, 9-69)

139-K. (German.) **Pressure Welding at Low Temperature.** H. Jacob. *Fertigungstechnik,* v. 7, Sept. 1957, p. 393-399.

(*) Articles Available Through Photocopy Service; See Coupon, p. 63.

Conditions for perfect pressure welding of various metals; factors in aluminum welding. Examples of applications. Influence of deformation velocity, formation of oxide layers, surface deformation, surface roughness and temperature upon the strength of the weld. 27 ref.
(K5, 2-63, K9)

140-K.* Dip Brazing Aluminum With Paste Filler Metal. *Canadian Metalworking,* v. 21, Jan. 1958, p. 38, 40, 42, 44, 46.

Alumibraze is an Al-Si filler metal consisting of 88% Al and 12% Si (AWS designation BAlSi-4), and melts between 1070 and 1080° F. Alumibraze has been used with more than a dozen wrought alloys including types EC, 1100, 3003, 5050, 5052, 5056, 5254, 6053, 6061, 6062, 6063, 6066, X2219 and X5356, as well as several cast alloys. (K8n; SGA-f, Al)

141-K. How to Get Stronger Al-Fe Bonds. Samuel Storchheim. *Iron Age,* v. 180, Dec. 5, 1957, p. 136-138.

Experimental study of hot pressure bonding. Dependence of ultimate tensile strength of Al-Fe couples on time, temperature and pressure. Microstructure of bond.
(K5k; Q27a, M27f; Al, Fe)

142-K. Weld Copper Cooling Coils for Fast Production. *Iron Age,* v. 180, Dec. 12, 1957, p. 135.

(K1d, W18a, 4-60; Cu)

143-K. Tips on Welding Stainless. H. F. Reid, Jr. *Iron Age,* v. 180, Dec. 26, 1957, p. 58-60.

(K general; SS)

144-K. Welding Stainless Steels. R. E. Paret. *Machinery,* v. 91, Nov. 8, 1957, p. 1095-1102.

(K general; SS)

145-K. Why Product Manufacturers Are Switching to Stitching. Kim Darby. *Modern Metals,* v. 13, Nov. 1957, p. 48-51.

Metal stitching or stapling speeds fabricating and assembling for variety of metal parts. (K13)

146-K.* Something New in Joining Nonferrous Metals. *Modern Metals,* v. 13, Nov. 1957, p. 70, 72.

Process employing complex chloride compound can join almost all nonferrous metals to each other except alloys high in Ni or Si. Joining takes place at temperatures below melting point of either metal. Electrical and mechanical properties of joint are similar to base metal properties. (K6, EG-a38)

147-K. Welding Rod Trends. R. K. Lee. *Steel,* v. 141, Dec. 9, 1957, p. 180-186, 191.

Functions and advantages of welding electrodes with coatings containing Fe powder. (K1a, W29h)

148-K. How To Weld Copper and Its Alloys. Pt. 1. Lester F. Spencer. *Steel,* v. 142, Jan. 27, 1958, p. 86-89.

Of the six possible methods, properties desired in the joint will determine choice. Rules for the inert-gas metal-arc method given. (To be continued.) (K general, K1d; Cu)

149-K.* Fabrication of Stainless Steel Honeycomb Sandwich Structures. W. J. Lewis, G. E. Faulkner and P. J. Rieppel. *Tooling and Production,* v. 23, Jan. 1958, p. 73-77.

Welding and machining honeycomb core of 17-7PH stainless steel; fabrication of edge members, techniques in cleaning and brazing sandwich panels.
(K general, G17, K8; SS, 7-59)

150-K. Assembly of Electric Iron Components. L. G. Northfield. *Welding and Metal Fabrication,* v. 25, Oct. 1957, p. 394-396.

Spot welding operations in joining Ni-Cr strip to Ni-Ag leads and joining Ni-plated mild steel to Ni-Ag.
(K3n, T10a; SGA-s, Ni, Cu, CN)

151-K.* Inert-Gas Tungsten-Arc Welding SAE 4130 Steel Sheet. Pt. 1. C. A. Terry and W. T. Tyler. *Welding and Metal Fabrication,* v. 25, Oct. 1957, p. 397-402.

Influence on weld porosity of sheet surface condition and microstructure, shielding gas impurities, surface of filler wire and inadequate shielding. Effect of cooling rate and welding speed on weld cracking. 10 ref.
(K1d, 3-67; AY, 4-30, 9-72)

152-K. Welding With Ultrasound. Thomas A. Dickinson. *Welding and Metal Fabrication,* v. 25, Oct. 1957, p. 403-404.

Ultrasonic sound energy utilized to weld fine wire and foil components of both similar and dissimilar materials including Cu, Al, brass and stainless steel alloys. A 2000-watt unit made spot and seam welds in metal parts with thicknesses from 0.002 to 0.050 in.
(K3n, K3p, 1-74; Al, Cu, Zn, SS)

153-K.* Welds Made Between Some Wrought and Cast Aluminum Alloys, and Welds in Some Cast Aluminum Alloys. J. C. Bailey, J. A. Hirschfield and T. Horwood. *Welding and Metal Fabrication,* v. 25, Nov. 1957, p. 434-441.

Welding procedure and properties of welds made by tungsten-argon-arc and metal-arc welding processes between different combinations of wrought and cast Al alloys. Mechanical properties determined for combination of NS3, NS6, HS30, LM4-M, LM5-M and LM6-M alloys.
(K1, Q general; Al)

154-K.* Inert-Gas Tungsten-Arc Welding SAE 4130 Steel Sheet. Pt. 2. C. A. Terry and W. T. Tyler. *Welding and Metal Fabrication,* v. 25, Nov. 1957, p. 442-448.

Effect of cooling rate, base metal microstructure and metal composition on incidence of transverse cracking in welds made in SAE 4130 steel sheet by argon-shielded tungsten-arc welding procedures. Carbide segregation in form of pearlite banding exerted strong influence on weld cracking. Severe external restraint and increasing carbon content increased extent of cracking. 4 ref.
(K1d; AY, 4-30, 9-72)

155-K. Flash-Butt Weld Procedures for Extruded Titanium Parts. R. N. Foster. *Welding Engineer,* v. 43, Feb. 1958, p. 29-30.

Material most commonly welded by the resistance flash-butt process is the 99% pure Ti grade defined in ASM 4921, although many rings have been welded with various Ti alloys (A 110 AT, 1 50 A, and C 120 AV).
(K3, Ti, 4-58)

156-K. Air Compressors in Welding Operations. *Welding Engineer,* v. 43, Feb. 1958, p. 42-43.

(K3, W29q)

157-K. Automatic Submerged-Arc Welders Prime Aids at Harvester. D. L. Hansen. *Welding Engineer,* v. 43, Feb. 1958, p. 62-64.

Procedure followed at International Harvester Co. in welding the box section C-frame, corresponding to tractor size, to which the bulldozer blade is fastened.
(K1e, T4; ST)

158-K.* Performance of Welds in Some Aluminum Alloys. Paul B. Dickerson. *Welding Journal,* v. 37, Feb. 1958, p. 107-113.

Inert-gas-shielded-arc welding has improved performance in Al welds. Strength and ductility of butt welds in various Al alloys, longitudinal and transverse shear strengths of fillet welds, effect of temperatures from −400 to 700° F. upon the tensile properties and resistance to corrosion of several of the high-strength weldable alloys. (K1d; Al)

159-K. Uses of Oxygen and Acetylene Gases in the Refrigerator Industry. Paul Bowman. *Welding Journal,* v. 37, Feb. 1958, p. 120-123.

Applied to welding, braze welding, Ag brazing, and soldering.
(K2, K6q, K7, K8, RM-g30, RM-g33)

160-K. Revised Welding Practices Pay Off in the Jet-Engine Industry. F. J. Bacon. *Welding Journal,* v. 37, Feb. 1958, p. 124-126.

Fit-up standards, basic cause and results of loose fits.
(K general, S22, T24b)

161-K.* Development of Filler Wires for Welding SAE 4130, 4140 and 4340 Steels. H. W. Mishler, R. P. Sopher and P. J. Rieppel. *Welding Journal,* v. 37, Feb. 1958, p. 41s-48s.

Filler wires for inert-gas tungsten-arc and inert-gas consumable-electrode welding of high-strength low-alloy aircraft steels. Weld-metal porosity, weld-metal cracking tendency, heat treatment, response as compared with the base materials, strength of heat treated weld joint and weld metal toughness. Two filler wires were developed for welding each steel. One of each pair of filler wires had a composition similar to the base material, while the other was of dissimilar composition. (K1d; W29h, AY)

162-K.* High-Vacuum Electron-Beam Fusion Welding. W. L. Wyman. *Welding Journal,* v. 37, Feb. 1958, p. 49s-53s.

New vacuum process consists of bombarding two pieces to be fusion welded with a beam of electrons in a high-vacuum chamber. Basic elements are a tungsten cathode to emit a large number of electrons; a high potential, several thousand volts between the cathode and plate to accelerate the electrons; a focusing system to form the electrons into a beam, a vacuum chamber and pumping equipment to maintain a pressure of 5×10^{-3} mm. of mercury. Work directed toward development of Zircaloy-2 welding procedures.
(K6, 1-73; Zr)

163-K.* Nature of High-Temperature Brazing Alloy-Base Metal Interface Reactions. W. Feduska. *Welding Journal,* v. 37, Feb. 1958, p. 62s-73s.

Microstructural and hardness characteristics analyzed at brazed joint interfaces, in the unaged, aged and superheated conditions of combinations of five types of high-temperature base metals and three types of high-temperature brazing alloys. 6 ref.
(K8, M27f, Q29n; SGA-h, SGA-f)

164-K.* Weldability of Notch-Ductile Steels. L. Reeve. *Welding Journal,* v. 37, Feb. 1958, p. 74s-80s.

Weldability tests on a series of C-Mn steels, including a number of ND (notch-ductile) steels supplied in accordance with the new British Standard Specification 2762 (1956)

for notch-ductile steels. CTS and Battelle cracking tests have been used. 7 ref.
(K9s, 1-54 ,CN)

165-K. (German.) **Welding and Cutting Aluminum With Rare Gas Shielded Electrodes.** W. Mantel and L. Wolff. *Aluminium,* v. 34, Jan. 1958, p. 36-40.
(K1d, G22h; Al)

166-K. (German.) **Influence of Gases in Arc Welding of Steel.** J. D. Fast. *Schweissen und Schneiden,* v. 9, Dec. 1957, p. 512-517.

Interaction between gas and liquid weld metal; formation of blowholes; aging phenomena and brittleness. 20 ref.
(K1, K9n, 9-68; ST)

167-K. (German.) **Influence of Hydrogen on the Properties of Welds.** P. C. van der Willigen. *Schweissen und Schneiden,* v. 9, Dec. 1957, p. 517-521.

15 ref. (K general, 9-72; H)

168-K. (German.) **Metallurgical Reactions Between Brazing Alloys and Base Materials.** Johanes Schatz. *Schweissen und Schneiden,* v. 9, Dec. 1957, p. 522-530.

Thermodynamic considerations in designing for brazing. 29 ref.
(K8, 17-51; SGA-f)

169-K. (Spanish.) **National Welding Contests.** I. Semprun. *Ciencia y Tecnica de la Soldadura,* v. 7, Nov-Dec. 1957, 4 p.

Sixth and seventh national contests in oxy-acetylene and electric welding sponsored by Welding Institute of Spain to advance interest in techniques and standards of performance; results showed that many shops still do not have adequate training and inspection programs.
(K general, A5d, A6m)

170-K. (Spanish.) **Planning of Welded Structures to Increase Productivity.** G. Repeczky. *Ciencia y Tecnica de la Soldadura,* v. 7, Nov-Dec. 1957, 14 p.

Pre-planning and coordination of design, welding methods, equipment, materials handling; time and cost estimates; responsibility of personnel in each area.
(K general, A4s, A5; SGB-s)

171-K. (Spanish.) **Welding Productivity in Japanese Naval Construction.** Masao Yoshiki and Hirosi Kihara. *Ciencia y Tecnica de la Soldadura,* v. 7, Nov-Dec. 1957, 23 p.

Japanese shipyards are building 60,000-ton ore and oil transport vessels. Organization of welding departments, accounting and shop order procedures; techniques and equipment; figures on total welded lengths, weights of welded elements, man-hours; mechanical aids, electrode and flux consumption, power consumption; training of welders, metallurgical and technical problems.
(K general, A5, A6, T22)

172-K.* (Pamphlet.) **Soldering Aluminium.** A. D. A. Information Bulletin 23, Nov. 1957. 35 p. Aluminium Development Assoc., 33 Grosvenor St., London, W.1, England. 2 s.

Basic principles; alloys suitable for soldering; types of solders and fluxes; methods and equipment; soldering Al to other metals; characteristics of soldered joints; choice of solder and soldering methods. 14 ref. (K7; Al)

173-K. (Book.) **New Lessons in Arc Welding.** 301 p. 1957. Lincoln Electric Co., Cleveland 17, Ohio.

Basic information on theory and techniques. Lessons deal with welding of a variety of materials. Operating procedures and information on machines and electrodes. (K1)

L Cleaning, Coating and Finishing

126-L.* Anomalies in the Growth of Anodic Oxide Films on Rough Surfaces. L. Young. *Acta Metallurgica,* v. 5, Dec. 1957, p. 711-716.

During the growth of anodic oxide films, surface irregularities of the scale of the thickness of the oxide film are believed to be flattened. The original inner layers of the oxide (new layers are formed on the outside, since metal ions move) are, therefore, constrained to cover a progressively smaller area. The resultant compressive stresses will produce failure if the original metal surface is rough enough. It has been confirmed that with such surfaces progressively less charge is required to form oxide to a given potential at a fixed current density. 21 ref. (L19)

127-L. Barrel Finishing Cuts Costs. *Automatic Machining,* v. 19, Dec. 1957, p. 50-52.
(L10d)

128-L. Chemical Surface Preparation of Structural Steel After Erection. Christopher D. Coppard, John H. Lawrence, F. S. Bricknell and Henry W. Adams. *Corrosion,* v. 13, Nov. 1957, p. 141-142.
(L14b; ST)

129-L. Epoxy Coatings Perform Well on Steel Exposed to Chemicals, Corrosive Atmospheres. William M. Brackett. *Corrosion,* v. 13, Nov. 1957, p. 144-146.
(L26p, R3, R6; ST)

130-L. Controlling Corrosion of Textile Mill Air Conditioning Equipment. J. Livingstone. *Corrosion,* v. 13, Nov. 1957, p. 147-148.

Use of zinc-base paints.
(L26n; R3)

131-L. Electroplating From The Pyrophosphate Bath. Pt. 2. Electrodeposition of Alloys. T. L. Rama Char. *Electroplating and Metal Finishing,* v. 10, Dec. 1957, p. 391-392, 408.

Methods used for electrodeposition of many alloys. 15 ref. (To be continued.) (L17)

132-L.* Recent Developments in Copper Plating. D. E. Weimer. *Institute of Metal Finishing, Bulletin,* v. 7, Autumn 1957, p. 13-14.

Application and deposit characteristics of Cu required in decorative electroplating. Research and developments directed toward overcoming problems in electrodeposition of Cu from cyanide and acid sulphate solutions. Characteristics and properties of pyrophosphate Cu solution and deposits obtained from it. 15 ref. (L17; *Cu*)

133-L. Vacuum Deposition Avoids Embrittlement. V. Dress. *Iron Age,* v. 180, Dec. 19, 1957, p. 142-145.

Cadmium coatings on steel aircraft parts do not develop hydrogen embrittlement but meet all military specifications for adherence, corrosion resistance, coating thickness and uniformity.
(L25g, Q26s, *Cd,* ST)

134-L. Vitreous Enamelling Aluminium. *Light Metals,* v. 20, Nov. 1957, p. 354-356.
(L27; Al)

135-L. Production of Enamelling and Zinc-Coated Steel Sheets. *Metal Finishing Journal,* v. 3, Oct. 1957, p. 401-407.

Facilities and operation in a British plant producing steel sheets and strips suitable for vitreous enamelling or galvanizing. Continuous line for hot dip coating strip. Sequence in coating sheets by electrozinc process. (L27, L17; 4-53; ST *Zn*)

136-L. Enamelling of Aluminium. A. Biddulph. *Metal Finishing Journal,* v. 3, Oct. 1957, p. 418-424.

Cleaning and preparation of Al sheets, extrusions or castings. Routine in milling Al enamel frit; application of coat, drying and fusing.
(L27; Al)

137-L.* Some Advances in Tinplate Technology. W. E. Hoare. *Metal Progress,* v. 73, Jan. 1958, p. 91-96.

Tighter thickness tolerances, annealing for both stiffness and ductility, improved tinning machinery (both electrolytic and "roller coatings"), electronic control of high-speed lines, new devices for rapid estimation of corrosion resistance.
(L17, L16, F23, ST, Sn)

138-L. Multi-Roll Burnishing Gives Fine Finish. M. J. Delany, Jr. *Metalworking Production,* v. 101, Nov. 22, 1957, p. 2093-2096.
(L10b; ST)

139-L. "Stress Free" Plating Brings Benefits. Edward Calderon. *Metalworking Production,* v. 101, Dec. 20, 1957, p. 2268-2269.

Aircraft components are salvaged and quality improved with nickel sulphamate plating bath.
(L17a, T24; *Ni*)

140-L.* Effect of Addition Agents on the Plating of Nickel. A. Goswami. *Scientific and Industrial Research, Journal,* v. 16B, July 1957, p. 315-317.

The effect of addition agents and brighteners on cathodic crystal growth in a Watt's type of Ni-plating bath with a pH favorable to lateral growth has been studied by electron diffraction. Addition agents producing a high cathode polarization result in outward growth deposits. 11 ref. (L17a; *Ni*)

141-L.* Decoration of Tinplate by Roller Coater and Offset Tinprinting Machine. J. M. Boyle and J. Matthews. *Sheet Metal Industries,* v. 35, Jan. 1958, p. 35-46.

Metal decoration on flat sheets of tinplate or steel which are to be fabricated after the decoration is complete. Techniques, materials and their control, equipment, the automatic tinplate feeder and run-in, the roller coater, the conveyor oven and the automatic oven unloader, and the printing machines.
(L26b; ST, *Sn*)

142-L. Barrel Finishing Operation Improves Fatigue Strength of Jet Engine Parts. J. D. Marble and C. V. Ruehrwein. *Tool Engineer,* v. 39, Nov. 1957, p. 99-101.

Compares surface finish and fatigue strength of AISI 4130 steel subjected to different finishing processes; barrel finishing selected as preferable to shaping, grinding, hand polishing, electrolytic grinding or electrodischarge machining.
(L10d, T24b; ST)

143-L. Planning Barrel Finishing Operations. Ralph F. Enyedy. *Tool Engineer,* v. 39, Dec. 1957, p. 105-107.
(L10d)

144-L. Found: Deoxidizing Process to Clean Molybdenum for Welding. Edwin R. Calderon. *Western Metalworking,* v. 15, Dec. 1957, p. 61-62.
(L12; Mo)

145-L.* (French.) **Use of Flux in Galvanizing.** A. Herz. *Metallurgie*

(*)Articles Available Through Photocopy Service; See Coupon, p. 63.

et la Construction Mecanique, v. 89, Nov. 1957, p. 955-957.

Spelters and their properties; Hachmeister's equilibrium diagram; loss of Zn; fluxing in double salts; cover fluxing. (L16; *Zn,* RM-q)

146-L. (German.) **Electrolytic Polishing of Metals.** *Chemische Rundschau,* v. 10, Oct. 11, 1957, 3 p.

Methods; comparison with mechanical polishing; application to Fe and its alloys, Al and noble metals. (L13p; Fe, ST, Al, EG-c)

147-L. (German.) **Zinc Dust Protective Coatings With Electrically Conductive Adhesives.** Martin Kuhn, Otto Breier, Anneliese Otto and Peter Weidlich. *Farbe und Lack,* v. 63, Nov. 1957, p. 535-541.

14 ref. (L29; *Zn*)

148-L. (German.) **Preparation of Metal Surfaces for Lacquering.** H. Kohlhase. *Feingerate Technik,* v. 6, Aug. 1957, p. 371-375.

Main procedures for preparation under special consideration of electrolytic oxidation of Al alloys and phosphating of steel. (L14b, L19, L26n; Al, ST)

149-L.* (German.) **Vitreous Enameling of Cast Iron.** D. Kamran. *Giesserei,* v. 44, Nov. 21, 1957, p. 705-713.

Scale structure and oxidation rate of cast iron in different gases; comparison of surface roughness of shot-blasted coatings and shot-blasted plate; effect of added elements on castings to be enameled; effect of superheating the melt and repeated remelting; effect of moisture. Adhesion of enamel on spheroidal cast iron and on white cast iron. 23 ref. (L27; CI)

150-L. (German.) **Protection of Buoy-Boats by Metal Spraying.** Siegfried Hoffmann. *Schiffbautechnik,* v. 7, Sept. 1957, p. 511-516.

Zn and Al spraying has shown that higher costs are justified by longer and better protection. (L23, T22g; *Al, Zn*)

151-L. (German.) **Practical Application of Conversion Technique in Shipbuilding.** A. Habedank. *Schiffbautechnik,* v. 7, Sept. 1957, p. 516-520.

Phosphating gave good results for surfaces below water but is not reliable in other applications. (L14b, T22g)

152-L. (German.) **Use of Oxy-Acetylene Process for Hard Surfacing Parts Subjected to Wear, With Particular Reference to Lathe Tools.** Grix, Siebel and Fleck. *Schweissen und Schneiden,* v. 9, Nov. 1957, p. 473-483.

10 ref. (L24, W25n, 17-57)

153-L. (Japanese.) **Anodic Oxidation of Titanium. Pt. 2.** Kyuya Nagasaki and Haruo Ishida. *Light Metals* (Tokyo), v. 7, Sept. 1957, p. 70-72.

5 ref. (L19; Ti)

154-L. (Japanese.) **Wave Forms of Electric Current in Anodic Oxidation of Aluminum by Oxalic Acid Process.** Toyoji Ushioda, Osamu Yoshimura and Takashi Abe. *Light Metals* (Tokyo), v. 7, Nov. 1957, p. 64-67.

(L19q; Al)

155-L.* **Protective Linings for Steel Shipping Containers.** Louis J. Nowacki. *Corrosion,* v. 14, Feb. 1958, p. 100t-102t.

Factors affecting lining performance include metal surface conditions, chemical and physical characteristics of lining, lining application and curing. Tests for linings and lined containers include product resistance, coating continuity, lining thickness, reverse-impact resistance, degree of cure. Types of lining materials available. (L26, W12c; ST)

156-L. **Airless Spray Coating.** *Machinery (London),* v. 91, Nov. 15, 1957, p. 1169-1170.

Spray painting. (L26)

157-L. **Polishing Aluminium and Its Alloys.** W. K. Bates and C. D. Coppard. *Metal Finishing Journal,* v. 4, Jan. 1958, p. 5-10, 26.

Chemical process, called Phosbrite 159, which is one of a range of chemical processes for polishing Al, Ni, Cu and Cu alloys (including basis and cartridge brass and gilding metals). (L12f; Al)

158-L.* **Anodic Oxidation of Aluminium Alloys Containing Copper.** J. Herenguel and P. Lelong. *Metal Finishing Journal,* v. 4, Jan. 1958, p. 20-23.

Speed of oxidation (or the current density) decreases markedly with increase of Cu content for the same voltage. Its importance has been measured with a high degree of precision on a series of Al-Cu alloys prepared from 99.99% purity Al containing from 0 to 4% Cu and perfectly homogenized by hot working. (L19, 2-60; Al, *Cu*)

159-L. (French.) **Plated Stainless Steel Sheet.** *Metallurgie et la Construction Mécanique,* v. 89, Nov. 1957, p. 935-937.

Advantages of plated stainless; choice of thicknesses, selection of base metal, amount of plating, as influenced by end use. (L17, 17-57; SS)

160-L.* (French.) **On the Anodic Oxidation of Aluminum Alloys Containing Copper.** Jean Herenguel and Pierre Lelong. *Revue de l'Aluminium,* v. 34, Dec. 1957, p. 1197-1200.

Speed of oxidation, variations in thickness and yellow coloration in anodic film formed on homogeneous solid solution of high-purity Al-Cu analyzed as function of Cu concentration, current density, applied voltage, temperature, chemical composition of electrolyte. 4 ref. (L19; Al, *Cu*)

161-L. (German.) **Control of Optimal Condition for Electrolytic Polishing and Some New Developments in Baths.** I. Epelboin. *Metalloberflache,* v. 11, Nov. 1957, p. 346-349.

Some new methods for measuring the impedance modulus. This led to the determination of optimal bath concentrations. New types of baths of melted salts and melted metal hydroxides were developed. 17 ref. (L13p)

162-L. (German.) **Progress in Metal Spraying Techniques. Pt. 4.** H. Reiniger. *Metalloberflache,* v. 11, Nov. 1957, p. 361-365.

A survey of metal spraying techniques for protection against corrosion and scale, for sprayed bearings and other parts. Methods for repair and testing of sprayed surfaces. 91 ref. (L23, 10-54)

163-L. (German.) **Porosity of Nickel Plated Surfaces Caused by Oil.** K. Sommer. *Metalloberflache,* v. 11, Nov. 1957, p. 366-367.

5 ref. (L17, 9-68; *Ni*)

164-L. (German.) **Behavior of Some Base Materials During Electrolytic Plating. Pt. 1.** H. Hefele. *Metalloberflache,* v. 11, Nov. 1957, p. 368-370.

Defects on Ag plated brass sheets were traced back to the presence of beta-crystals and Pb precipitations in the alpha-structure. The critical range was found to be at 61 to 63.5% Cu and less than 0.1% Pb. (L17, 9-71; Ag, Cu, Zn, *Pb*)

165-L. (German.) **Automation in Surface Grinding and Polishing in Relation to Galvanizing Problems.** Otto Schleppi. *Metallwaren-Industrie und Galvanotechnik,* v. 48, Sept. 1957, p. 370-376.

Semi-automation advantageous technically and economically. (L10b, L16, G18k, 18-74)

166-L. (German.) **Ball Burnishing; Some Principles of Barrel Operation.** M. Dreher. *Metallwaren-Industrie und Galvanotechnik,* v. 48, Sept. 1957, p. 377-380.

Types of barrel construction; loading; form and size; operating time; speed of rotation. (L10b, W2s)

167-L. (German.) **Stainless Steel Polishing.** Klaus Heckrott. *Metallwaren-Industrie und Galvanotechnik,* v. 48, Sept. 1957, p. 395-396.

Advantages of bonded polishing wheels emphasized. (L10b, W2p; SS)

168-L. (German.) **Economy in the Use of Oils for Metal Grinding and Polishing.** H. Windisch. *Metallwaren-Industrie und Galvanotechnik,* v. 48, Sept. 1957, p. 396-399.

Proper fluid with proper application reduces working time, increases tool life, has advantageous cooling effect and results in better worked surfaces. (L10b, G18; NM-h)

169-L. (German.) **Mechanical Descaling of Wire Rod by Shot Blasting.** Erich Jaenichen, Alfred Duphorn, Hans Krautmacher and Wilhelm Püngel. *Stahl und Eisen,* v. 77, Dec. 12, 1957, p. 1785-1795.

4 ref. (L10c; ST, 4-61)

170-L. **Surface Treating and Protectively Coating Aluminum Windows.** R. J. Anen. *Industrial Finishing,* v. 34, Jan. 1958, p. 28-32.

Efficient, automatic cleaning, etching and laquering system on mass production scale. (L12, L26n, 18-74; Al)

171-L. **Industrial Baking Enamels. Pt. 1.** E. G. Shur. *Industrial Finishing,* v. 34, Jan. 1958, p. 52-58.

Historical review of synthetic resins as protective coatings. (L26p, A2)

172-L. **Spray Metal Where it Counts.** *Industry and Welding,* v. 31, Jan. 1958, p. 50-51, 66-67.

Examples of metallizing with stainless steel and spray welding with a powdered Ni-Cr-B mixture for protection against corrosion and wear. (L23; SS, B, Ni, Cr)

173-L. **Vacuum Deposition Avoids Embrittlement.** V. Dress. *Iron Age,* v. 180, Dec. 19, 1957, p. 142-145.

Cadium coatings on steel aircraft parts do not develop hydrogen embrittlement but meet all military specifications for adherence, corrosion resistance, coating thickness and uniformity. (L25g, Q26s; ST, *Cd*)

174-L. **Blast Cleaners Treat Parts in Line.** *Iron Age,* v. 180, Dec. 26, 1957, p. 52-53.

(L10c; 18-74)

175-L. **New Coating Gives Magnesium Extra Protection.** *Iron Age,* v. 181, Jan. 9, 1958, p. 64-66.

New air-drying thermosetting copolymer resin coating withstands thermal shock expected in missile applications. (L26p; Mg)

176-L. **Lubricate Close Fits by Salt Bath Sulfurizing.** G. B. Troup. *Iron Age,* v. 181, Jan. 9, 1958, p. 72-74.

(L15, 18-73; ST)

177-L. **New Japanese Hard Chromium Plant.** Yoshio Hirasawa. *Metal Finishing,* v. 56, Feb. 1958, p. 55-57.

The Aikoku Plating Industry Works, Ltd., Tokyo. (L17, *Cr*)

178-L. **Barrel Chromium Plating—Continuous Bulk Processing.** Henry Mahlstedt. *Metal Finishing,* v. 56, Feb.

1958, p. 58-60.

Operation of a newly developed continuous Cr plating barrel, recently installed at I.B.M. electric typewriter plant at Kingston, N. Y., makes it possible to obtain hourly plating output equal to that from 3½ to 4 batch barrels with greater economy and sharply reduced need for inspection. (L17, W3b; *Cr*)

179-L. Decoration of Tinplate by Roller Coater and Offset Tinprinting Machine. J. M. Boyle and J. Matthews. *Metal Finishing Journal,* v. 3, Nov. 1957, p. 441-448, 462.

(L26f, L26n; Sn)

180-L. Application of Vitreous Enamel by the Electrostatic Process. S. Hallsworth. *Metal Finishing Journal,* v. 3, Nov. 1957, p. 449-452, 464.

(L27)

181-L. Continuous Surface Pretreatment Processes With Particular Reference to "Nitec" Sheet for Vitreous Enamelling. W. H. F. Tickle and D. A. Winton. *Metal Finishing Journal,* v. 3, Nov. 1957, p. 453-455.

(L27, L12, 5-53; ST)

182-L. Acid Copper Plating With Particular Reference to the Use of the Ubryco Process. M. R. Marshall. *Metal Finishing Journal,* v. 3, Nov. 1957, p. 457-458, 462.

(L17; *Cu*)

183-L. Some Notes on Liquid Polishing Compositions. R. G. Hughes. *Metal Finishing Journal,* v. 3, Nov. 1957, p. 459-461.

(L10b)

184-L. Experiences and Problems in the Surface Treatment of Die-Castings. Pt. 4. Electrolytic Processes. W. Rüegg. *Metal Industry,* v. 91, Nov. 29, 1957, p. 459-462.

14 ref. (L17, L19; *Cr, Ni,* Zn, 5-61)

185-L. Tough Tenacious Coating. *Modern Metals,* v. 13, Nov. 1957, p. 74-80.

Half-second butyrate has many advantages as clear colorless coating for Al. (L26p; Al)

186-L.* Antimony Plating on Steel and Zinc. G. R. Schaer, W. H. Safranek and C. L. Faust. *Plating,* v. 45, Feb. 1958, p. 139-143.

Antimony may be plated adherently and continuously on steel, if the steel is first conditioned by anodic treatment in acid solutions, or is electroplated with iron. Anodic acid activation of steel prior to plating improved the corrosion resistance of Sb-plated steel, but did not improve the corrosion resistance of Zn-plated steel. Sb-plated steel resisted corrosion better than Zn-plated steel in salt spray fog and in air saturated with water vapor. 14 ref. (L17, R3p; ST, *Zn, Sb*)

187-L. Vacuum Coatings Go Industrial. Philip J. Clough. *Product Engineering,* v. 28, Dec. 23, 1957, p. 67-69.

(L25g)

188-L. Epoxy Coatings: Performance and Application Data. Fred Grushoff. *Products Finishing,* v. 22, Jan. 1958, p. 42-47.

(L26p)

189-L. Brighter Prospects for Brass and Copper. Paul H. Margulies. *Products Finishing,* v. 22, Jan. 1958, p. 54-57.

Use of persulphate for cleaning brass and copper prior to painting or plating. (L12g; Cu)

190-L. Role of Oxygen in Iron-Enamel Adherence. *Products Finishing,* v. 22, Jan. 1958, p. 58-64.

Investigation at National Bureau of Standards on relationships between adherence of porcelain enamel to iron and the oxygen content of the furnace atmosphere and the amount of cobalt oxide in the enamel. (L27, 2-66, 14-68; CI)

191-L. Pickling Stainless to Remove Scale. W. E. McFee. *Steel,* v. 141, Nov. 25, 1957, p. 103-107.

(L10c, L10d, L12g; SS, 9-52)

192-L. Wet Blast Finishing Goes Automatic. *Steel,* v. 141, Dec. 16, 1957, p. 106-107.

Automatic machine directs stream of liquid abrasive from blast gun to give metal parts clean ultrasmooth surface. (L10c, 18-74)

193-L. One Machine Anodizes Many Colors. *Steel,* v. 141, Dec. 30, 1957, p. 65-67.

(L19n, W3h; Al)

194-L. Progress of Bright Tin Plating. *Tin and Its Uses,* no. 41, Winter, p. 1-3.

(L17; *Sn*)

195-L.* Metal Spraying in Inert Atmospheres. R. E. Monroe, D. C. Martin and C. B. Voldrich. *Welding Journal,* v. 37, Feb. 1958, p. 114-119.

Zirconium coatings deposited on uranium by this method were porous and contained many spray particles which were not satisfactorily flattened out during deposition. A diffusion heat treatment after spraying was effective in eliminating the boundaries between individual Zr particles. As-sprayed and heat treated Zr coatings had good adhesion to U. (L23; U, *Zr*)

196-L. (Czech.) **Improving the Quality of Galvanizing.** Karel Janecky. *Korose A Ochrana Materialu,* v. 1, no. 5-6, 1957, p. 76-83.

11 ref. (L16; *Zn*)

197-L.* (French.) **Thermal Oxidation of Cast Iron in Relation to Its Suitability for Powder Enameling.** Roland Piva. *Fonderie,* no. 143, Dec. 1957, p. 533-544.

Four cast irons of varied compositions and surface characteristics were subjected to nine series of tests. Determinations were made of speed of hot oxidation as function of type of surface preparation (buffing, shot blasting, chemical cleaning); speed of attack by sulphuric acid; adherence of enamel as function of speeds of oxidation after chemical cleaning. For good adherence, iron surface should be free of magnetic oxide film and sufficiently rough to give optimum degree of oxidation. Influence of duration of chemical cleaning and of heating temperature. 4 ref. (L27, L12; CI)

198-L. (French.) **Girder Galvanizing Plant of Societe Metallurgique de l'Aisne.** *Metallurgie et la Construction Mécanique,* v. 89, Dec. 1957, p. 1033-1040.

Works layout, storage and mechanical preparation of girders; chemical preparation; heating plant; galvanizing. (L16, 18-67; *Zn*)

199-L. (Swedish.) **Electrochemical Surfacing.** Emanuel Warsztecki. *Teknisk Tidskrift,* v. 87, Sept. 3, 1957, p. 693-696.

Grinding and polishing by electrolytical processes. Reduction of diamond wear by electrolytic grinding. 3 ref. (L13p, G24d)

M Metallography

Constitution and Primary Structures

63-M.* Interpretation of Roll Textures of Face-Centered Cubic Metals. E. R. W. Jones and E. A. Fell. *Acta Metallurgica,* v. 5, Dec. 1957, p. 689-671.

Evidence from two different approaches is shown from which it is concluded that a mixture (110) [112] and (112) [111] textures describes the roll texture of f.c.c. metals better than (123) [412]. 7 ref. (M26c)

64-M.* Additional Modes of Deformation Twinning in Magnesium. R. E. Reed-Hill and W. D. Robertson. *Acta Metallurgica,* v. 5, Dec. 1957, p. 717-727.

Evidence is presented for the existence of two additional modes of deformation twinning, (3034) and (1013), produced by tensile stress parallel to the basal plane in Mg single crystals. The crystallographic mechanism of formation of (3034) twins is discussed in detail because fracture occurs by a parting mechanism in this twin. The temperature dependence of both modes of twinning, in the range of −190-286° C., is unusual in that they are formed most readily at higher temperatures. 14 ref.

(M26c, Q24b, 2-60; Mg, 14-61)

65-M.* Density of Dislocations in Compressed Copper. L. M. Clarebrough, M. E. Hargreaves and G. W. West. *Acta Metallurgica,* v. 5, Dec. 1957, p. 738-740.

Changes in energy, macroscopic density and electrical resistivity associated with the annealing of deformed Cu have been measured. Three independent estimates of the density of dislocations in the deformed material are obtained by combining these results with the best available theoretical values for the energy, density and resistivity changes associated with dislocations. 11 ref.

(M26b, P15g, J23; Cu, 14-61)

66-M.* Thermodynamic Properties of Silver-Gold Alloys. J. L. White, R. L. Orr and R. Hultgren. *Acta Metallurgica,* v. 5, Dec. 1957, p. 747-760.

Correlating functions have been developed for the purpose of evaluating thermodynamic data on binary alloy systems, and these functions have been applied to the extensive published data on the Ag-Au system. 34 ref. (M24b, P12; Ag, Au)

67-M. Isopiestic Techniques Applied to Phase Diagram Determination in the Systems Silver-Cadmium and Copper-Cadmium. H. W. Rayson and W. A. Alexander. *Canadian Journal of Chemistry,* v. 35, Dec. 1957, p. 1571-1575.

Two methods of determining phase boundaries and solubilities of binary systems in which volatility of one component is negligible compared with the other. 9 ref.

(M24b; Ag, Cd, Cu)

68-M. Lattice Constants of Separated Lithium Isotopes. E. J. Covington and D. J. Montgomery. *Journal of Chemical Physics,* v. 27, Nov. 1957, p. 1030-1032.

6 ref. (M26, 14-63; Li)

69-M.* Investigation of the Nickel-Rich Portion of the System Ni-Zr.

(*)Articles Available Through Photocopy Service; See Coupon, p. 63.

Emma Smith and R. W. Guard. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1189-1190. (CMA)

Alloys containing up to 60 at. % Zr were made in a study of the Ni-rich end of the Ni-Zr system. Procedures are described. The solid solubility of Zr in Ni is less than 1 at. %, and microstructures are essentially single phase. Compounds have been identified tentatively as Ni_5Zr, Ni_7Zr_2, Ni_5Zr_2, Ni_5Zr_4 and NiZr. Ni_5Zr is face-centered cubic with $a = 6.71$ Å, and is isomorphous with Ni_5U and Cu_5U. Other structures appear complex. 4 ref.
(M24b; Ni, Zr)

70-M.* Cross-Rolling and Annealing Textures in High-Purity Iron. Hsun Hu. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1164-1168.

X-ray Geiger counter spectrometer used for determination of texture following deformation and annealing of cross-rolled high-purity iron. Deformation texture predominantly (100), [011] plus minor texture components of (111), [110] or (111) or [112] in partially recrystallized specimen; minor deformation texture components were replaced by new orientation while major deformation texture was retained. Texture developed after complete recrystallization could be described as rotations around each of the (110) poles of minor textured components. 12 ref.
(M26c, N5; Fe-a)

71-M.* Preparation and Diffraction Data of Ba-Al Alloys. Dilip K. Das and Douglas T. Pitman. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1175.

Arrangement for preparation of Ba-Al_4 and X-ray diffraction data for powdered Ba-Al_4.
(M22g; Ba, Al)

72-M.* Stability of AISI Alloy Steels. A. B. Wilder, E. F. Ketterer and D. B. Collyer. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1176-1181.

Changes in microstructure observed in typical AISI constructural alloy steels in welded and unwelded conditions after exposure for 34,000 hr. at 900, 1050 and 1200° F. Tensile and creep-rupture properties after exposure for 10,000 hr. 9 ref.
(M27d, Q27a, Q3m, 2-62; AY)

73-M. (German.) Systems Zirconium-Sulphur and Structure of Some Compounds. Harry Hahn, Berhnard Harder, Ursula Mutschke and Peter Ness. *Zeitschrift für Anorganische und Allgemeine Chemie,* v. 292, Nov. 1957, p. 82-96.

X-ray examination established existence, in addition to already known compounds ZrS_3 and ZrS_2, of compounds ZrS and Zr_4S_3 and of phases Zr_3S_4. 13 ref.
(M24b, M26r, Zr, *S*)

74-M.* Investigation of Grain Boundary Phase in Stainless Steel. C. C. Clark, J. R. Mihalisin and K. G. Carroll. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1210-1211.

Electron micrographs, electron diffraction data in chemical analysis used for exploring grain-boundary precipitate thought to be responsible for anomalous behavior of particular heat of Type 310 stainless steel. Possible relationship of precipitate to iron boro-carbide and chromium carbide. (M27f; SS)

75-M.* The Uranium-Silicon Epsilon Phase. S. Isserow. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1236-1239.

Investigation of composition, corrosion resistance, physical and mechanical properties and extrusion constant of epsilon alloy of U- Si. Corrosion resistance depended upon absence of phases other than epsilon. Epsilon phase has Si content in the range of 3.9 to 4%. 5 ref.
(M26q, R general; U, *Si*)

76-M.* CsCl-Type Ordered Structures in Binary Alloys or Transition Elements. T. V. Philip and Paul A. Beck. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1269-1271. (CMA)

Among the binary alloys studied for CsCl-type structures were V-Fe, Ti-Fe, Ti-Co, Ti-Ni and Ti-Re. The Ti-Re alloys are found to have a body-centered cubic structure. Bond strengths decrease when V is substituted for Ti, which has a strong tendency to form CsCl-type structures. The bond strength increases from TiNi to TiCo to TiFe. 8 ref.
(M26; 2-60; Ti)

77-M. Cylindrical Carbide Particles. J. H. Westbrook. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1277.

Notes on the structure of cylindrical carbide particles formed in chromium carbide alloys containing 3.2% C. Phases present alloy identified as alpha Cr and $CR_{23}C_6$.
(M27, 14-68; ST)

78-M. Distribution of Boron in Gamma Iron Grains. R. M. Goldhoff and J. W. Spretnak. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1278-1283.

Distribution of B in gamma Fe grain as a function of temperature by means of three experimental techniques including grain growth in high-purity FeC and FeC-B alloys. X-ray diffraction measurements of lattice parameters of FeB alloys as function of temperature and metallographic tests for B in grain boundaries. Boron undergoes adsorption to gamma Fe grain boundaries and temperature coefficient of adsorption is positive. 27 ref.
(M25m; Fe, B)

79-M. Crystallographic Angles for Manganese Bismuthide. W. J. Romanow. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1284.

Note giving table of angles between crystallographic plane of manganese bismuthide. 7 ref.
(M26q; Mn, Bi)

80-M. Recent European Advances in Optical Metallography. Roland Mitsche. *Metal Progress,* v. 73, Jan. 1958, p. 97-101.

Modern microscopes are designed to avoid fatigue of the operator, with automatic timing, continuous focusing and multiple light sources. Attachments exist for hardness tests and visual observations, in vacuum or controlled atmospheres, at temperatures from −325 to +2700° F.
(M20, M21, M23, 1-53)

81-M. Annealing of Electron Bombardment Damage in Silicon Crystals. G. Bemski and W. M. Augustyniak. *Physical Review,* v. 108, Nov. 1, 1957, p. 646-648.

Experiments with displacement of stationary nuclei from their normal lattice positions and kinds of damage caused thereby. 12 ref.
(M25, 2-66; Si)

82-M. Growth of Oxide Whiskers on Metals at High Temperatures. Riitsu Takagi. *Physical Society of Japan, Journal,* v. 12, Nov. 1957, p. 1212-1218.

Use of electron microscopy and diffraction in studying specimen from uniformly oxidized wire. 10 ref. (M21h, M22h, M26r; Fe)

83-M.* The Metallographic View. Pt. 39. The Martensitic Stainless Types. Howard E. Boyer. *Steel Processing and Conversion,* v. 43, Oct. 1957, p. 568-569.

Microstructures of air-cooled and tempered Types 440-C, 416 and 410 martensitic stainless steels, chemical composition and hardness values.
(M27, Q29n; SS)

84-M. The Metallographic View. Pt. 50. Ferritic and Austenitic Stainless Types. Howard E. Boyer. *Steel Processing and Conversion,* v. 43, Nov. 1957, p. 625, 646.

Microstructure and hardness of Types 430 and 321 stainless steels in annealed conditions, and Type 302 following cold working.
(M27, Q29n; SS)

85-M. (French.) Metallography of Low-Carbon Steels. L. Habraken and T. Greday. *Revue Universelle des Mines de la Metallurgie de la Mecanique et des Travaux Publics,* v. 13, 1957, p. 683-692.

Study of martensitic and bainitic transformations. Relationship between mechanical and physical properties and microstructures was observed by electron microscopy.
(M21e, N8, P general; Q general; Cn-g)

86-M. (German.) Structure and Transformation Behavior of Very Quickly Solidified Mg-Treated Cast Iron. Roland Mitsche. *Berg-und Hüttenmännische Monatshefte,* v. 102, July-Aug. 1957, p. 204-213.

13 ref. (M27, N8q, E25n; CI, *Mg*)

87-M. (Russian.) Achievements and Trends in Development of Soviet Metallography. M. L. Bernshtein, M. E. Blanter and M. L. Lozinskii. *Zavodskaya Laboratoriya,* v. 23, no. 10, 1957, p. 1202-1211.

5 ref. (M general)

88-M. (Russian.) Electron Microscopy in the Soviet Union. R. Ya. Berlaga, V. N. Vertsner and A. A. Lebedev. *Zavodskaya Laboratoriya,* v. 23, no. 10, 1957, p. 1214-1219.

(M21f)

89-M.* Observation of Dislocations in Silicon. W. C. Dash. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 57-68.

A technique has been developed to decorate dislocations in Si so they are visually observable with an infrared image tube in conjunction with a microscope. Silicon single crystals were grown by drawing from the melt contained in a quartz crucible. These were then etched during a period of several hours or overnight in a mixture of nitric, hydrofluoric, and acetic acids to produce deep pits at the points of emergence of the dislocations.
(M26b, M20q; Si)

90-M.* Direct Observations of the Arrangement and Motion of Dislocations in Aluminum. P. B. Hirsch, R. W. Horne and M. J. Whelan. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 92-115.

It has been possible to observe directly dislocations in Al by transmission electron microscopy using

a high resolution electron microscope. Most of the specimens examined so far were prepared by heating 99.99 + % Al and 99.8% Al at room temperature, followed by etching in dilute HF. 13 ref.
(M26b, M21e; Al)

91-M.* Thermal Etching of Dislocations in Silver. E. S. Machlin. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 164-171.

Dislocations in Ag may be revealed by a thermal etch technique. It is believed pits are formed at the points of emergence of dislocations as a result of the equilibration of the dislocation line tension and the surface tension. In this technique, electropolished Ag is immersed in a dynamic flow of A containing 10 mole % of oxygen at 600° C. for 5 to 10 min. and then cooled to room temperature in purified A.
(M26b, M20q; Ag)

92-M.* Thermal Etching of Dislocations. Hideji Suzuki. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 172-175.

Thermal etching technique can be applied to most metals and alloys, except for some metals having high vapor pressure at high temperature, such as Zn, Cd, Mg and their alloys. Some examples of Fe-Ni alloys which were oxidized at 1100° C. for 30 min. are shown. (M26b, M20q)

93-M.* Mechanism of Glide and Work Hardening in Face-Centered Cubic and Hexagonal Close-Packed Metals. Alfred Seeger. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 243-329.

A theoretical picture is given for the dislocation processes governing the plastic properties of face-centered cubic metals and alloys and of hexagonal metals with basal glide. It is based on the similarities and dissimilarities of the dislocations in face-centered cubic and hexagonal close-packed structures and in metals and alloys with low and high stacking fault energies. It accounts for the critical shear stress of pure metals and dilute alloys, work hardening, recovery, surface markings (slip bands) and creep. 146 ref.
(M26b, Q24)

94-M.* Lattice Defects in Plastically Deformed Metals. W. Boas. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 333-344.

In all metals investigated, irrespective of the heating rate and of whether deformation occurs by tension, compression or torsion, there is a rapid evolution of energy at the high-temperature end of the curve showing the release of energy. This energy release is always associated with recrystallization, as has been proved by metallographic and X-ray methods. It is accompanied by changes in hardness, density and electrical resistivity. This energy is derived from the disappearance of the dislocations created by deformation. 19 ref. (M26s, M26b, N5)

95-M.* Nature and Effect of Substructure in Polycrystalline Aluminum. C. J. Ball. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 353-358.

Subgrain size decreases with increasing deformation and approaches a limiting value which increases linearly with the temperature of deformation. The types of stress-free low-angle boundary that can be formed without climb with dislocations of one, two, or three systems have been calculated. If dislocations of only one or two systems are present, the possible rotation axes are [100], [111], and in the plane (110). (M26b, M27c; Al)

96-M.* A Comparison of Preyield Microstrain in Steel With Dislocation Theory. D. S. Wood. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 413-418.

If a stress is suddenly applied to the material and maintained constant thereafter, the initial rate of plastic straining should be proportional to the rate of release of dislocations from atmospheres. Experimental record of tensile load and preyield inelastic microstrain versus time under conditions of rapidly applied constant load. Experimental curves of microstrain versus time for several values of applied tensile stress at room temperature. For stress less than the upper yield stress (about 40,000 psi.) the microstrain asymptotically approaches some equilibrium value.
(M26b, Q24h; ST)

97-M.* Theory of Whisker Dekinking. F. R. N. Nabarro. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 521-536.

Several different mechanisms for the straightening on annealing of a single crystal whisker which has been plastically kinked. Analysis shows that the only mechanism of straightening which will explain the high and roughly uniform rate of the process is that of dislocation climb by migration of vacancies or interstitial ions. The rate of evolution of vacant lattice sites from jogs in dislocations is only sufficient to maintain this rate of climb if the edges of the dislocations are densely packed with jogs. Dislocation glide may account for the rapid initial recovery. 11 ref. (M26b, 14-61)

98-M.* Thermal Annealing of Imperfections in the Noble Metals. J. S. Koehler, J. W. Henerson and J. H. Bredt. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 587-602.

The annealing of irradiated, quenched, cold worked, and evaporated noble metals is examined. Six stages of annealing are described; the associated activation energies range from 0.1 to about 2.1 ev. An attempt is made to assign each stage of annealing to a particular atomic process. The magnitude of the resistance introduced by dislocations is considered. 36 ref.
(M26s, M26b, J23, P13a; EG-c)

99-M.* (Czech.) **Plastic Deformation of Steel During Repeated Heating-Cooling Cycles and Microstructures of Metals and Alloys at High Temperatures.** M. G. Lozinskij. *Hutnické Listy*, v. 12, Nov. 1957, p. 974-985.

Selective color oxidation permits observation of differences in orientation of individual grains and peculiarities of differences in microstructure in vacuum heating. IMAS-5M apparatus developed in the U.S.S.R. permits direct microscopic observation and photography of the deformation of the heated specimens. 21 ref. (M27, 2-62, X4, X5; ST)

100-M.* (German.) **Electron Microscope Studies of the Substructure of Chemically Brightened Aluminum Surfaces.** D. Altenpohl and W. Hugi. *Aluminium*, v. 33, Dec. 1957, p. 774-781.

Grains of chemically brightened Al surfaces contain more than 1000 subgrains, mostly 0.2-4 microns. Electron micrographs made on high purity Al showed the cast and heat treated structures, the cold rolled substructure, structures in the stress-relieved state and substructure after recrystallization. Correlation exists between the substructures and the position of the plane of observation in the crystal lattice, the purity of the Al, the cold reduction and the type of heat treatment. 11 ref.
(M27, M21e; Al)

101-M. (German.) **Investigations on the Phase Diagram of Iron (II) Oxide and Managanese (II) Oxide and Its Relation to the Deoxidation of Pure Iron With Managanese.** Herman Schenck, Norbert G. Schmahl and A. K. Biswas. *Archiv für das Eisenhüttenwesen*, v. 28, Sept. 1957, p. 517-521.

The phase diagram of the system iron (II) oxide and manganese (II) oxide was determined by observing the melting of small cylinders in a special furnace heated by a molybdenum spiral. The liquidus and solidus curves are described with thermodynamic calculations. The latent heat of fusion was determined for both substances, and the melting point of Mn (II) oxide was found to be 1750° C. The deoxidation diagram of pure iron with Mn was determined. 25 ref.
(M24c, P12, D11r; Fe, *Mn, O*)

102-M. (German.) **Electron Microscope Examination of Buffed and Ball Burnished Metal Surfaces.** M. Dreher. *Metallwaren-Industrie und Galvanotechnik*, v. 48, July, 1957, p. 284-288.

Advantages of both methods, with special attention to the development of electron microscopy.
(M21e, L10b, S15d)

103-M.* (French.) **Applications of Electron Micrography to Research in the Steelmaking Field.** J. Plateau and R. Tamhankar. *Métaux Corrosion, Industries*, v. 32, Oct. 1957, p. 359-381.

Review of principal research carried out by electron microscope on intercrystalline transformations and precipitation, precipitation and intergranular phenomena, surface phenomena, mechanical properties, dust and fumes in steelmaking process; techniques of specimen preparation. 128 ref. (M21e, M20; ST)

104-M. (Russian.) **X-Ray Investigation of Intercrystalline Internal Adsorption in Silver Alloys.** V. I. Arkharov and S. D. Vangengeim. *Fizika Metallov i Metallovedenie*, v. 4, no. 3, 1957, p. 439-446.

Change of lattice parameter in Ag alloys in the grains of different size due to contamination with metals adsorbed on the surface of the alloy crystals. 12 ref.
(M26, M21f, P13d; Ag)

105-M. (Russian.) **Crystallization of Trans-Eutectic Magnesium Gray Cast Iron.** A. V. Chernovol. *Metallovedenie i Obrabotka Metallov*, Oct. 1957, p. 21-22.

Chemical composition of the cast iron and micrographic investigation of the crystallization of the trans-eutectic, magnesium modified gray cast iron. 8 ref. (M27, E25n, CI, *Mg*)

106-M. (Russian.) **Nonmetallic Inclusions in Large Ingots.** A. I. Koshik and V. K. Barzii. *Stal'*, v. 17, Oct. 1957, p. 943-947.

Distribution of nonmetallic inclusions in ingots of 9 and 14 tons.
(M28h; 5-59, 9-69; ST)

(*)Articles Available Through Photocopy Service; See Coupon, p. 63.

107-M. (Russian.) **X-Ray Study of Surface Layers of Metals During Cold Working.** N. A. Petrova, M. Ya. Shashin and V. V. Latsh. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1372-1374.

5 ref. (M21f, Q24, 1-67)

108-M.* Experiments With an Electron and Iron Projector Tube. A. P. Komar and Iu. N. Talanin. *Academy of Sciences of the USSR, Bulletin, Physical Series,* v. 20, no. 10, p. 1029-1034. (Columbia Technical Transactions.)

Images obtained in working with an electron projector with a tungsten point under conditions of relatively "poor" vacuum with continuous evacuation of tube by oil diffusion pumps. 13 ref. (M21e, 1-53)

109-M.* Some Effects of Heterogeneous Structures in Lead Pipes. J. M. Butler. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 161-163.

Experiments indicate that lead pipes with heterogeneous (zoned) grain structures have a lower resistance to fatigue than either uniformly fine or uniformly coarse-grained pipes. Method for preventing the formation of heterogeneous structures by controlled deformation and recrystallization. The method might also be used to control grain size independently of extrusion conditions. 6 ref.
(M27c, N5, F24; Pb, 4-60)

110-M.* Plutonium-Iron System. P. G. Mardon, H. R. Haines, J. Pearce and M. B. Waldron. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 166-171.

Equilibrium diagram for Pu-Fe alloys. Results verify the existence of the compounds Pu_6Fe and $PuFe_2$, a low-melting-point eutectic between delta Pu and Pu_6Fe, and a high-melting-point eutectic between $PuFe_2$ and gamma iron. 11 ref.
(M24b; Pu, Fe)

111-M.* Preliminary Investigation of the Plutonium-Thorium System. D. M. Poole, G. K. Williamson and J. A. C. Marples. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 172-176.

X-ray, metallographic, thermal-analysis and dilatometric studies. Pu dissolves extensively in alpha Th, the maximum solubility being 48.5 at. % at 615° C. The large solubility of Pu in alpha Th is possibly associated with a considerable increase in the apparent atomic radius of the Pu atom; this large radius corresponds to a valency of 4 on Zachariasen's scheme, equal to that of Th. 4 ref. (M24b; Pu, Th)

112-M.* Aluminum-Rich Intermetallic-Compound Phases in the System Aluminium-Iron-Cobalt-Copper. G. V. Raynor. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 182-184.

Metallographic and X-ray methods and chemical analysis of primary crystals extracted from slowly cooled alloys show that the phases T(CoCu) and T(FeCu) form a complete series of solid solutions in the quaternary system Al-Fe-Co-Cu.
(M24d; Al, Fe, Co, Cu)

113-M.* Lattice Spacings and Melting Points in the Thorium-Cerium System. R. T. Weiner, W. E. Freeth and G. V. Raynor. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 185-188.

Thorium-cerium system studied by X-ray and micrographic methods shows complete solid solution over the whole composition range at room temperature. The alloys are face-centered cubic, and an anomalous decrease in the lattice spacing of the Th-rich alloys with increasing Ce content is observed. The solidus curve is determined up to 1550° C. A high-temperature vacuum furnace and a gravity-quenching technique were used above 1200° C. 13 ref.
(M26, P12n, M24b; Th, Ce)

114-M.* Constitution of Magnesium-Rich Magnesium-Aluminium-Calcium Alloys. J. A. Catterall and R. J. Pleasance. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 189-192.

Isothermal sections at 450, 370 and 290° C. of the Mg-Al-Ca system have been constructed at compositions up to 6% Al and 1.6% Ca. The phases appearing in this range are alpha (Mg), Mg_2Ca, Al_2Ca, and $Mg_{17}Al_{12}$.
(M24c; Mg, Al, Ca)

115-M.* Studies on Group III-V Intermetallic Compounds. C. Kolm, S. A. Kulin and B. L. Averbach. *Physical Review,* v. 108, Nov. 15, 1957, p. 965-971.

Properties of the compounds GaAs and InSb alloyed with Si, Ge, Sn and Pb; the quasi-binary InSb-GaSb also investigated. Lattice parameter, infrared absorption and electrical resistivity measurements were made. The forbidden energy gaps of the GaAs alloys were found to vary inversely with the spacing, with the one exception of the GaAs-Ge alloy, where the reverse effect was observed. On the basis of the infrared transmission and electrical resistivity data it was concluded that the Group IV elements substituted for nearest-neighbor pairs in GaAs, but in the case of Si and Ge in InSb it appeared that the substitution of only one atom in the unit polyhedron occurred. 13 ref.
(M26q, P15g; Ga, As, In, Sb)

116-M.* Study of Freshly Deformed Metal Surfaces With the Aid of Exo-Electron Emission. L. Grunberg. *Wear,* v. 1, Oct. 1957, p. 142-154.

Review of literature dealing with emission of exo-electrons from deformed metal surfaces. Recent investigations show that surface films on deformed metals contain special electron energy levels associated with crystal imperfections in the oxide lattice. The energy levels can be excited thermally or optically leading to electron emission at definite temperatures or wave lengths of light. 19 ref.
(M23, P15k, 3-68)

117-M.* High-Speed Dilatometer Designed for Welding Research. E. C. Nelson. *Welding Journal,* v. 37, Feb. 1958, p. 57s-61s.

Design and operation of a high-speed dilatometer capable of duplicating the rapid heating rates and high temperatures encountered in the heat-affected zone of a weld. Continuous cooling transformation diagram for a low-carbon high-alloy steel. Alternative methods of presenting such data. 4 ref.
(M23b, 1-53, K9r, N8; AY)

118-M.* Structure of Atoms and Atomic Aggregates. J. Bardeen, W. Bitler and J. E. Goldman. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 22-43.

Explains basic physical concepts of wave mechanics and the development of self-consistent theory of structure of atoms, molecules and multi-atomic aggregates. 20 ref.
(M25)

119-M. Crystal Imperfections. J. Bardeen. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 82-102.

Various types of imperfections in solids; wide variety of phenomena that are affected by them. 20 ref.
(W25s)

120-M. The Metallic State; Theory of Some Properties of Metals and Alloys. R. Smoluchowski. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 103-127.

Metallic state described in terms of crystallography and thermodynamics of phase equilibria; electronic structures of metals and alloys. 10 ref. (M26, M25, P12)

121-M.* Electron Theory of Alloy Formation and Elastic Properties. H. Jones. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 128-141.

Fermi energy and other wave mechanic concepts relate phase formation in alloys to the atomic properties of the constituents. Brief theoretical explanation of elastic properties of metals and alloys. 6 ref. (M25, Q21)

122-M.* Dislocations in Solids. R. Smoluchowski. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 142-160.

Nature, source and movement of dislocations in metals and crystals. Application of dislocation theory in the study of basic mechanisms in plastic deformation. (M26b, Q24)

123-M.* Dislocation Theories of Mechanical Properties. H. W. Paxton. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 161-178.

Relationship of dislocation theories to yield strength as influenced by work hardening, precipitation hardening, recrystallization and purity. 25 ref. (M26b, Q23b, Q23a, N5, N7)

124-M.* Experimental Evidence for Behavior of Dislocations. Earl R. Parker. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 179-195.

Dislocation theories related to mechanism involved in work hardening in creep and in strain aging of metals. 23 ref.
(M26b, N7e, Q23a, Q3)

125-M.* (German.) **Grain-Boundary Structure and Hot Tearing in Pure Aluminum.** F. Erdmann-Jesnitzer and G. Schweigel. *Aluminium,* v. 34, Jan. 1958, p. 14-20.

Creep and long-period loading in the region of pronounced crystal recovery and hot tearing are affected by grain-boundary substance and structure. Grain boundaries of fused 99.94% Al specimens were observed. Laue back-reflection diagrams for spatial orientation. Large-angle boundaries fuse first; small-angle boundaries melt much later. 25 ref.
(M27f, Q26q, 1-67; Al-a)

126-M. (German.) **System Iron-Silicon-Antimony.** Gerhard Zwingmann and Rudolf Vogel. *Archiv für das Eisenhüttenwessen,* v. 28, Sept. 1957, p. 591-595.

Investigated by means of chemical and thermal analysis. Conditions of equilibrium represented in a series of cross-sections through the system in the high porosity area of the three components. 6 ref.
(M24c; Fe, Sb, Si)

127-M. (Hungarian.) **Defects in Alpaca Alloys Caused by Phosphorus Contamination.** Zoltan Hegedüs and Mihaly Stefan. *Kohaszati Lapok,* v. 12, Nov. 1957, p. 470-472.

4 ref. (M27d, 9; Cu, Zn, Ni, *P*)

128-M. (Russian.) **Influence of Additives Upon Distribution of Sulphur in**

Steel. N. S. Kreshchanovskii and S. S. Kraskovskii. *Liteinoe Proizvodstvo,* June 1957, p. 22-26.

Influence of Al, Zr, Al-Ba-Ca alloy, Ce and Ca upon sulphur distribution in high-Cr steel.
(M27d, D9r, 2-60; SS, *S, Al, Zr, Al, Ba, Ca, Ce, Cr*)

129-M. (Russian.) **Distribution of Magnesium in Iron Alloys.** M. A. Krishtal and E. P. Rikman. *Liteinoe Proizvodstvo,* July 1957, p. 25-26.

Distribution of Mg in cast iron is not uniform. The highest concentration of Mg is at interface of graphite grains. 6 ref.
(M27f, E25q; CI, *Mg*)

130-M. (Russian.) **Influence of Nitrogen Content Upon Structure and Mechanical Properties of Gray Iron.** B. V. Bauman. *Liteinoe Proizvodstvo,* Aug. 1957, p. 24-26.

Incorporation of N into cast iron by blowing ammonia through the metal at 1360, 1450 and 1550° C. Graphs of mechanical properties in respect to N content for alloys containing Si, Mn, Cr, V, Al and Ti. Micrographs of cast iron with various N contents. (M27d, E25q, Q general; CI, *Al, Cr, N, Mn, Si, Ti, V*)

131-M. (Russian.) **Phase States and Intercrystalline Liquation in Iron-Carbon-Silicon Alloys.** Ya. N. Malinochka, *Liteinoe Proizvodstvo,* Oct. 1957, p. 19-22.

Phase diagrams of Fe-C-Si alloys at 1165, 1325, 1135 and 1150° C. 6 ref. (M24c; Fe, C, Si)

132-M. (Book.) **Dislocations and Mechanical Properties of Crystals.** J. C. Fisher, W. G. Johnston, R. Thomson and T. Vreeland, Jr. 634 p. 1957. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $15.

Relevant papers abstracted separately. (M26b, Q24)

133-M. (Book.) **Science of Engineering Materials.** J. E. Goldman, Ed. 510 p. 1957. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $12.

Proceedings of a symposium devoted to solid state science. Section on basic structure of matter, theory of metallic state and properties of metals and alloys. Surface phenomena, magnetic properties, physics of semiconductors and aspects of noncrystalline materials. Papers abstracted separately. (M general, N general, P general, Q general)

N — Transformations and Resulting Structures

83-N.* **Effects of Aging and Straining on the Internal Friction of Hydrogen Charged 1020 Steel at Low Temperatures.** L. C. Weiner and M. Gensamer. *Acta Metallurgica,* v. 5, Dec. 1957, p. 692-694.

Aging at room temperature or previous straining of hydrogen-charged 1020 steel causes an internal friction peak at 105° K. to appear, reach a maximum, decrease and finally disappear. This peak has been explained by a model which involves the dragging along of hydrogen atmospheres by oscillating dislocations. Another peak at 50° K. has been observed which is apparently due to stress-induced diffusion of interstitial hydrogen. 10 ref.
(N7e, Q22; CN, *H*)

84-N.* **Recrystallization During Creep of Prestrained Aluminum.** J. H. Auld, R. I. Garrod and T. R. Thomson. *Acta Metallurgica,* v. 5, Dec. 1957, p. 741-746.

Dependence of recrystallization time on the applied stress during creep of both lightly and heavily prestrained Al. The time for the onset of recrystallization increases progressively with increasing creep stress. Some suggestions, based on the structural changes produced during creep, are advanced to account for the manner in which this incubation time varies with applied stress and degree of prior deformation. 18 ref. (N5, Q3; Al)

85-N. **High Strength Without Heat Treatment.** *Design Engineering,* v. 3, Dec. 1957, p. 37-40.

Frontier 40-E, an aluminum alloy with Zn, Mg, Cr and Ti, attains properties of great strength, light weight, shock resistance on aging at room temperature or on adjacent aging at low temperatures.
(N7a, Q general; Al, *Cr, Mg, Ti, Zn*)

86-N.* **Carbide Precipitation in Several Steels Containing Chromium and Vanadium.** Arun K. Seal and R. W. K. Honeycombe. *Iron and Steel Institute, Journal,* v. 188, Jan. 1958, p. 9-15.

Tempering of several steels with the basic composition 0.2% C, 9% Cr studied using electron microscopic, X-ray and electron diffraction methods. The maintenance of hardness in the range 250-400° C. is shown to result from the stability of the fine cementite precipitate, a consequence of the high Cr content of the steels. Examination of extraction replicas in the electron microscope shows that between 400 and 550° C. the cementite redissolves in the ferrite and CrC is separately nucleated initially as a very fine precipitate (< 50 Å). 15 ref. (N7; AY, *Cr, V*)

87-N.* **Transformation Kinetics and Mechanical Properties of Zr-Mo Alloys.** R. F. Domagala, D. W. Levinson and D. J. McPherson. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1191-1196. (CMA)

TTT-curves were established for sponge-base Zr alloys with 1.3, 3.3, 5.4 and 7.5% Mo. The noses at 600-650° C. are moved to longer times with increasing Mo content. Resistivity measurements were the basis of the study. Tensile and impact test bars were obtained both as isothermally quenched and as quenched and reheated. The 1.3% Mo alloy showed the best mechanical properties. Others showed a brittle behavior regardless of heat treatment. The formation of omega-phase is implicated in this behavior. 9 ref. (N6n, Q general; Zr, *Mo*)

88-N.* **Phase Transformation in Hypoeutectoid Ti-Cr Alloys.** H. I. Aaronson, W. B. Triplett and G. M. Andes. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1227-1235. (CMA)

The proeutectoid alpha and eutectoid reaction of Ti-7.22Cr were studied in the 550-725° C. range. The ubiquitous grain boundary allotriomorphs are never the dominant morphology at late reaction times, as are Widmanstaetten dideplates above 675° C. (crystals are often degenerate). Below 650° C. intragranular plates are the dominant morphology. $TiCr_2$ crystals nucleate at alpha-beta boundaries at alpha allotriomorphs and plates, are engulfed by the growth of alpha and then nucleate at interphase boundaries, resulting in the further growth of alpha crystals. 15 ref.
(N9; Ti, Cr)

89-N.* **Formation of Intermetallic Layers in Diffusion Couples.** L. S. Castleman and L. L. Seigle. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1173-1174.

Note on existence of delta and epsilon phases in Al-Ni system as indicated by presence of intermediate layer formation with diffusion couples. Need for caution in applying diffusion couple technique to systems in which low-melting components are formed in conjunction with high-melting components.
(N1e; Al, Ni)

90-N.* **Some Characteristics of the Martensite Transformation of Cu-Al-Ni Alloys.** C. W. Chen. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1202-1203.

Transformation of phase beta sub 1 in Cu alloy containing 14.5% Al and 0.5 to 3.0% Ni studied metallographically with the aid of motion pictures. Gamma prime transformation began at 10° C. Reproducibility of martensite transformation. Effect of strain on transformation behavior. 8 ref. (N6q; Cu, *Al, Ni*)

91-N.* **Approximate Method for Calculations Using Concentration-Dependent Diffusion Coefficients.** A. G. Guy, M. Golomb and A. S. Yue. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1204-1206.

Approximate method permits a correction to be made for variation of diffusion coefficient with concentration using equations that apply for constant diffusion coefficient value. Method illustrated by use of Cu-Zn system for which time to reach steady state conditions was estimated within 20%. Also allows development of concentration distribution curves describing diffusion into semi-infinite solid with comparable accuracy to actual variation of diffusion coefficient with concentration. 6 ref. (N1b)

92-N.* **Diffusion of the Elements of the 1B and 11B Subgroups in Silver.** A. Sawatzky and F. E. Jaumot, Jr. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1207-1210.

Data on diffusion of Cu and Hg in single crystals of Ag. Present and previous data indicate activation energies for diffusion of atoms of a given subgroup into the same solvent or similar, but frequency factors differ. Atomic size does not affect activation energy provided solid solutions are formed. 10 ref.
(N1, P13a; Ag, 14-61, *Cu, Hg*)

93-N.* **Mechanism of Precipitation in a Cu-2.5% Fe Alloy.** J. B. Newkirk. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1214-1220.

Precipitation process in a Cu alloy containing 2.5% Fe studied experimentally by X-ray diffraction, hardness measurements, light and electron observations. Gamma Fe and alpha Fe precipitate simultaneously, with gamma Fe dominating in the early stages. During later stages the particles of gamma Fe dissolve providing the Cu lattice with Fe atoms which diffuse to the more stable alpha Fe particles. 20 ref.
(N7b; Cu, *Fe*)

94-N. **Nature of the Ni-Cr System.** Robin O. Williams. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1257-1260.

Nickel-chromium alloys containing between 16 and 60% Ni were examined by X-ray diffraction and metallographic techniques for the

(*)Articles Available Through Photocopy Service; See Coupon, p. 63.

purpose of determining nature of aging in terminal solid solutions and the nature of the phase diagram. Information was obtained on terminal solid solubilities in Ni and Cr systems. Rate and mode of precipitation during cooling. 8 ref.
(N7, M24b, Ni, Cr)

95-N.* **Growth of Iron Alloy Single Crystals From the Melt.** R. C. Hall. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1267-1268.

Apparatus for growing single crystals of Al-Fe alloys above 1% Al, and Si-Fe alloys above 3% Si. Consists of pointed crucible with molten metal charge which is slowly lowered through heated zone into cooler zone. Single crystal nucleates at bottom and grows through charge. 5 ref. (N3r, 1-53; *Al, Si,* Fe)

96-N. **Some Internal Friction Studies in Columbium.** R. W. Powers and Margaret V. Doyle. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1285-1288.

Diffusion of carbon in columbium investigated by internal friction measurements. At 1 cycle per sec. the damping peak arising from stress-induced ordering of C in Cb was found at 268° C. while the nitrogen peak was at 285° C. Activation energy and diffusion coefficients were calculated for C and N in Cb. 19 ref. (N1, Q22; Cb, *C, N*)

97-N. **Diffusion of Hydrogen Through Palladium.** A. S. Darling. *Platinum Metals Review,* v. 2, Jan. 1958, p. 16-22.

15 ref. (N1c; Pd, *H*)

98-N.* (English.) **Study on the Diffusion of Carbon in Gamma Iron by Internal Friction Method.** Ke T'ing-sui and Yang Pen-wei. *Scientia Sinica,* v. 6, Aug. 1957, p. 623-632.

In gamma-iron (containing 1.7% Mn), an internal friction peak was observed around 240° C. with a frequency of vibration of about 2 cycles per sec. The height of the peak increased with an increase of the carbon content and decreased when the specimen was annealed at an elevated temperature. The activation energy associated with this peak was found to be 34,000 ± 2000 cal. per mol which is close to the activation energy of diffusion of carbon in gamma-iron determined in macro-diffusion experiments. It is concluded that the observed internal friction peak is associated with the stress-induced diffusion of carbon in gamma-iron. 11 ref.
(N1e, Q22, P13a; Fe, *C*)

99-N* (Dutch.) **Crystalline Structure in the Recrystallization of Metals.** W. G. Burgers and T. J. Tiedema. *Metalen,* v. 12, Nov. 30, 1957, p. 458-464.

Grain boundary has a "structure" dependent on the mutual orientation relationship of the continuous grains. The influence of the orientation relationship between two adjacent grains on the grain boundary energy is illustrated by the equilibrium positions of the boundaries when heating a specimen of three crystals with pre-chosen orientation. Large grain growth at the expense of surrounding smaller grains, inclusion in a metal crystal and a possible nucleation process involving the polygonization of local curvatures present in the original deformed matrix are explained with a grain boundary dislocation model. 12 ref.
(N5, N3)

100-N.* (Italian.) **X-Ray Diffraction Determination of Recrystallization Curves of Aluminum as Function of Purity.** M. Paganelli. *Alluminio,* v. 26, Dec. 1957, p. 517-523.

Specimens of Raffinal, AP-8, AP-5 and AP-0 were subjected to varying degrees of cold working, then annealed for 1 hr. For low degrees of cold working final temperature of recrystallization increased with decrease in purity of specimen; opposite was true for high degree of cold working. 6 ref.
(N5, Q24, 1-67, M22g; Al)

101-N. (Japanese.) **Effects of Low-Temperature Deformation on Recovery Phenomena of Aluminum.** Jiro Wada, Masanobu Sasagawa and Shigeo Kobayashi. *Light Metals (Tokyo),* v. 7, Sept. 1957, p. 10-20.

10 ref. (N4, M27c, 2-63; Al)

102-N. (Japanese.) **Study of Grain Size in Aluminum Sheets. Pt. 5.** Takashi Ikeno. *Light Metals (Tokyo),* v. 7, Sept. 1957, p. 21-28.

(N3, N5; Al, 4-53)

103-N. (Japanese.) **Effect of Anodic Oxidation Treatment on Grain Size in Aluminum Sheets. Pt. 6.** Takashi Ikeno and Chogo Keiji. *Light Metals (Tokyo),* v. 7, Sept. 1957, p. 29-37.

6 ref. (N3, L19; Al, 4-53)

104-N. (Japanese.) **Study of Aging of Aluminum Alloy by Means of Specific Volume Analysis.** Takuichi and Shigeo Zaima. *Light Metals (Tokyo),* v. 7, Sept. 1957, p. 42-49.

Specially prepared samples of Al alloys were weighed on a precision chemical balance before and after aging. 8 ref. (N7a, P10d; Al)

105-N. (Japanese.) **Relationship Between Strength and Structure of Hot Drawn Aluminum Alloy Bars.** Hiroshi Asada, Kiehizo Koike and Saburo Morimoto. *Light Metals (Tokyo),* v. 7, Nov. 1957, p. 21-28.

Hot drawing did not affect high-strength property of extruded Al bars but strength was affected by size of substructure. In cold drawing, tendency of recrystallization temperature was to increase. 23 ref.
(N5, Q27a; Al, 4-58)

106-N. (Japanese.) **Studies on Aluminum-Magnesium Casting Alloys. Pt. 5.** Yasuji Nakamura. *Light Metals, (Tokyo), v.* 7, Nov. *1958,* p. 48-55.

Solubility effects of Si in the region of higher Mg content. 7 ref.
(N12p; Al, *Mg, Si,* 5)

107-N. (Czech.) **Methods of Diffusion Study by Radioactive Isotopes.** Josef Cadek and Emil Janda. *Hutnické Listy,* v. 12, Nov. 1957, p. 1008-1020.

Methods of measuring diffusion coefficient, particularly those using radioactive isotopes. 55 ref.
(N1, 1-59)

108-N. (French.) **Intergranular Diffusion in Metals.** Georges Cizeron. *Métaux, Corrosion, Industries,* no. 385, Sept. 1957, p. 315-332.

Intergranular self-diffusion is studied by diffusion of radio tracers, measurement of grain growth and by interpretation of several phenomena. Influence of orientation of the grains and impurities. 59 ref. (N1d, 1-59)

109-N. (German.) **Structure Analyses of Alloy Steels With High Content of Carbide Forming Components.** Angelica Schrader, Adolf Rose, Leo Rademacher and Wolfgang Pitsch. *Archiv für das Eisenhüttenwesen,* v. 28, Aug. 1957, p. 461-468.

The transformation process in the pearlite phase was investigated on two steels. Optic and electron microscope as well as electrochemical and revolving crystal X-ray examinations were carried out. The disintegration of austenite and the formation of various eutectoid carbide phases explained. Crystal forms are analyzed and new interpretations offered for electron diffraction diagrams. 6 ref.
(N8, M22h; AY)

110-N. (German.) **Influence of Carbon Content on the Disintegration of Austenite and Related Reactions.** Werner Jellinghaus. *Archiv für das Eisenhüttenwesen,* v. 28, Aug. 1957, p. 469-481.

Under the assumption that carbon has a definite influence on the formation of the phases at temperatures below the pearlite point, experiments were carried out on six steels with carbon contents from 0.16 to 1.02%. The transformation velocity in the pearlite phase is proportional to increasing carbon content. This phenomenon is evident in phases just below the pearlite point, where the transformation velocity for ferrite is increased with decreasing carbon content. At still lower temperatures the transformation velocity is slowest in the middle range of carbon content. 17 ref.
(N8, 2-60; ST, *C*)

111-N. (German.) **Influence of Low Carbon Content on the Recrystallization of Iron.** Frank Haessner and Paul Schwaab. *Archiv für das Eisenhüttenwesen,* v. 28, Sept. 1957, p. 583-590.

Primary recrystallization and grain growth observed on cold rolled sheets from high-purity iron. Influence of 0.006% C and 0.0015% C using thickness reduction, annealing temperature and annealing time as variables. Higher carbon reduced the area of recrystallization and the recrystallization temperature. Carbon also influences rate of nucleation and speed of nuclear growth. After primary recrystallization, grain growth slows down and finally stops. The final grain size is independent of both temperature and sheet thickness. 26 ref.
(N5f, N3m, 2-60; Fe-a, *C*)

112-N.* (German.) **Effect of Austenitizing Conditions on the Structure and Behavior of Plain Carbon Steels During Transformation.** Heinz Borchers and Günter Saur. *Stahl und Eisen,* v. 78, Jan. 9, 1958, p. 40-46.

Survey of the literature on effect of annealing temperature and time on ferrite grain size, austenite grain and network and their relationship. Relationship between annealing time and temperature in austenitizing, cooling rate, carbon content, grain size, structure and undercooling. Tests on plain carbon steels, 0.1 to 0.35% C; determination of structure after isothermal transformation. 45 ref. (N8; CN)

113-N. (Russian.) **Transformation of Cementite Into Austenite and Ferrite Upon Graphitization and Decarburization of Cast Iron.** K. P. Bunin and S. N. Ivanov. *Metallovedenie i Obrabotka Metallov,* Oct. 1957, p. 2-4.

Mechanism of cementite transformation with possibility of solid solution formation within the cementite phase. (N8f, N8s; CI)

114-N. (Russian.) **Peculiarities of Change of Properties of Austenitic Steel 10X25H20.** V. I. Prosvirin and L. F. Chernov. *Metallovedenie i Obrabotka Metallov,* Oct. 1957, p. 5-12.

Growth of austentic grain and hardness increase in respect to time at 1200 and 1300° C. on subsequent

aging at 650 and 750° C. Change of mechanical properties of the steel upon heat treatment. Kinetics of steel brittleness at elevated temperatures.
(N3, Q29n, Q26s, 2-64, 2-65; AY)

115-N.* Certain Aspects of the Recrystallization of Lead and Dilute Lead Alloys. J. M. Butler. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 155-161.

Conditions under which commercial leads similar to those used for water-pipes may recrystallize in manufacture or service to give undesirable heterogeneous structures. Effects of extrusion temperature, of water quenching and of composition of the lead; methods of avoiding deleterious structures. Recrystallization behavior of Pb containing small additions of Cu, Sb, As, Cu, plus Ni, Cu plus Ag, and Cu plus Te. 14 ref. (N5, 3-70, 2-60; Pb)

116-N.* Diffusion of Uranium Into Aluminum. T. K. Bierlein and D. R. Green. *Nuclear Science and Engineering,* v. 2, Nov. 1957, p. 778-786.

The maximum penetration in the range 200-390° C. investigated. The maximum values for the penetration coefficient are 0.075, 0.50, and 6.1 × 10^{-6} sq. in. per hr. at 200, 250, and 390° C., respectively; the corresponding activation energy is 14,300 cal. per mole. Cathodic vacuum etching to obtain clean specimen surfaces prior to the diffusion anneal. Couples prepared in the temperature range investigated fracture by the application of tension between the Al and the adjacent U-Al diffusion zone interface. Subsequent measurement of the maximum U-Al peak heights above the initial U-Al interface assures a maximum value of the penetration coefficient. The investigation provides a basis for interpreting the effect of irradiation on the diffusion rates. 7 ref.
(N1b, N1h; U, Al)

117-N. Processing 310 Stainless Minimizes Carbides. Hiram Brown. *Steel,* v. 142, Jan. 27, 1958, p. 72-73.

Prestraining test sheets, then stress-relieving at 1000 to 1400° F. before solution heat treatment precipitates carbides within the grains rather than at grain boundaries, thereby permitting easier solution of carbides by the use of normal solution temperature. (N7; J1a, J27a; SS)

118-N.* Phase Transformation in Metals and Their Influence on Mechanical Properties. T. A. Read. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 196-215.

Precipitation from solid solution, pearlite and bainite formation, martensite reaction and their relationship to crystal structure imperfections and their influence on mechanical properties. 10 ref.
(N general, Q general)

119-N.* (English.) **Role of Interfacial Energy During Solid State Phase Transformations.** Mats Hillert. *Jernkontorets Annaler,* v. 141, Nov. 1957, p. 757-789.

Calculation of changes of equilibrium at curved interfaces between two crystals due to interfacial energy. Evaluation of composition and size of critical nucleus from free energy. Application on formation of nuclei from supersaturated solutions. Growth of a new phase and of an aggregate of two new phases from a parent phase. 24 ref.
(N2, N8, P13h; ST)

120-N. (Hungarian.) **Structural Diagrams of Cast Iron.** Nandor Hajto. *Kohaszati Lapok (Ontöde),* v. 12, Nov. 1957, p. 211-222.

Metallurgical and technological factors determining the structure of castings. 25 ref. (N8; CI)

121-N. (Norwegian.) **Diffusion in Binary Alloys.** O. J. Kleppa. *Tidsskrift for Kjemi, Bergvesen og Metallurgi,* v. 17, no. 4, 1957, p. 53-58.

Quantitative treatment of diffusion and tracer diffusion. Determination of the relation between chemical and tracer diffusion. 22 ref.
(N1e, 1-59)

122-N. (Russian.) **Influence of Oxidation Upon Graphite Formation in Cast Iron.** K. P. Bunin, G. Z. Kovalchuk and S. A. Fedorova. *Liteinoe Proizvodstvo,* July 1957, p. 15-16.

Investigation of cast iron annealing in reducing and oxidizing environment. Rate of graphitization was considerably increased by annealing of cast iron with simultaneous oxidation. 15 ref. (N8s, J23; CI)

123-N. (Russian.) **Austenitic Cast Iron With Spheroidal Graphite.** F. N. Tavadze, I. A. Bairamishvili and D. V. Khantadze. *Liteinoe Proizvodstvo,* July 1957, p. 16-17.

Cast iron modified with Mg introduced as Ni-Mg alloy results in formation of graphite in a spheroidal form with good mechanical working properties of the product. 5 ref.
(N8s, E25q, Q general; CI, *Mg*)

124-N. (Russian.) **Formation of Graphite in Cast Iron During Crystallization and Heat Treatment.** K. P. Bunin. *Liteinoe Proizvodstvo,* Oct. 1957, p. 15-18.

Graphitization on crystallization and after solidification. 68 ref.
(N8s; CI)

Physical Properties

69-P.* Control of Oxygen in Sodium Heat Transfer Systems. I. L. Gray, R. L. Neal and B. G. Voorhees. Paper from "Liquid Metals Technology", Pt. 1. Chemical Engineering Progress Symposium Series, p. 11-18.

Plugging indicators used on Na and NaK flowing systems to determine oxygen concentration from 3 to 300 ppm. with accuracies of greater than 0.001% oxygen. Cold traps containing wire mesh packing successfully reduced oxygen content of Na system to values less than 10 ppm. and operated on system whose initial oxygen content was supersaturated in excess of 800° F. 8 ref. (P11k, 1-53; Na, *O*, 14-60)

70-P.* Thermal Conductivity of Metals. C. T. Ewing, B. E. Walker, J. A. Grand and R. R. Miller. Paper from "Liquid Metals Technology", Pt. 1. Chemical Engineering Progress Symposium Series, p. 19-24.

Develops a general thermal conductivity equation for metals based on the concept of electronic and molecular conduction; its application in the prediction of thermal conductivity values, degree of correlation for 140 metals and alloys over wide temperature ranges. Equation valid for both liquid and solid metals. 33 ref. (P11h, 14-60)

71-P.* Pool-Boiling Heat Transfer With Mercury. C. F. Bonilla, J. S. Busch, Arnold Stalder, N. S. Shaikhmahmud and Arcot Ramachandran. Paper from "Liquid Metals Technology", Pt. 1. Chemical Engineering Progress Symposium Series, p. 51-57.

Nature of boiling and necessary temperature differential observed for Hg boiled on horizontal low-carbon steel plate at pressures from 4 to 2300 mm. of mercury absolute, at depths of 2 to 10 cm. and heat velocities of 4000 to 200,000 Btu. per hr. per sq. ft. with and without the addition of wetting agents. 13 ref. (P11k; ST, Hg, 14-60)

72-P. Adsorption and Diffusion of Hydrogen on Nickel. R. Wortman, R. Gomer and R. Lundy. *Journal of Chemical Physics,* v. 27, Nov. 1957, p. 1099-1107.

13 ref. (P13d, N1h; *H*, Ni)

73-P.* Misfit Strain Energy in the Au-Cu System. Ralph Hultgren. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1240-1243.

Misfit strain energy calculated for the tetragonal gold-copper superlattice from interatomic distances and Morse functions. Electronic re-arrangement occurs during uni-axial tension reducing the strain energy. Application and discussion of Pauling's theory on electronic re-arrangements. 16 ref. (P12, N10; Au, Cu)

74-P.* Application of Radioactive Tracers to Surface Studies. R. W. Cahn. *Institute of Metal Finishing, Bulletin,* v. 7, Autumn 1957, p. 1-12.

Preparation and decay properties of radioactive isotopes and methods used for locating and measuring radiation. Application and some results obtained with tracers in studying exchange of ions between metal and a solution containing the same or other metal ions; adsorption of a gas on a metal, mechanism of passivation in corrosion studies, electroplating and metal transfer in friction. 26 ref. (P18h, 1-59)

75-P. How to Take Advantage of Magnetic Core Materials. J. A. Roberts, A. Schmeckenbecker and G. Ludwig. *Metal Powder Association, Proceedings, 13th Annual Meeting,* v. 2, 1957, p. 153-159.

Permeability and core losses are factors to be considered in selecting magnetic materials for high-frequency inductance coils. 5 ref.
(P16, T1m, 17-57; SGA-n, Fe, 6-72)

76-P. Magnetic Cores in Miniature Electronic Circuits. David M. Hodgin. *Metal Powder Association, Proceedings, 13th Annual Meeting,* v. 2, 1957, p. 160-167.

Problems and applications of ferrite materials in electronic components.
(P16, T1c, 17-57; SGA-n, Fe, 6-72)

77-P. Characteristics and Present Requirements of Ferrites. R. D. Harrington. *Metal Powder Association, Proceedings, 13th Annual Meeting,* v. 2, 1957, p. 177-188.

General properties of ferrites and their application to electronic devices. 23 ref.
(P16, T1, 17-57; Fe, 6-72)

78-P. Latest Developments in Magnetic Storage and Switching Applications. James W. Schallerer. *Metal Powder Association, Proceedings, 13th Annual Meeting,* v. 2, 1957, p. 189-195.

The present and future expansion for uses of square hysteresis loop ferrite materials. 4 ref.
(P16, T1d, 17-57; SGA-n, Fe, 6-72)

79-P. Thermal Expansion of Ferrites at Temperatures Near the Curie Point. W. R. Buessem and A. Dorf. *Metal Powder Association, Proceedings, 13th Annual Meeting,* v. 2, 1957, p. 196-204.

5 ref. (P11g, P16; SGA-n, Fe, 6-72)

(*)Articles Available Through Photocopy Service; See Coupon, p. 63.

80-P. Heat Capacity of Cu_3Au Below 4.2° K. John A. Rayne. *Physical Review,* v. 108, Nov. 1, 1957, p. 650-651.

13 ref. (P12r, 2-63; Cu, Au)

81-P. Soft X-Ray Absorption by Thin Films of Vanadium. Bipin K. Agarwal and M. Parker Givens. *Physical Review,* v. 108, Nov. 1, 1957, p. 658-659.

7 ref. (P17c; V)

82-P. Resistivity of Interstitials in Copper. R. J. Potter and D. L. Dexter. *Physical Review,* v. 108, Nov. 1, 1957, p. 677-682.

14 ref. (P15g; Cu)

83-P. Magnetic Susceptibility of Germanium. Raymond Bowers. *Physical Review,* v. 108, Nov. 1, 1957, p. 683-689.

(P16; Ge)

84-P.* Electric Resistivity of the Ni-Pd Alloy System Between 300 and 730° K. A. I. Schindler, R. J. Smith and E. I. Salkovitz. *Physical Review,* v. 108, Nov. 15, 1957, p. 921-923.

The maximum in resistivity was found to shift from 70 at.% Pd, 30 at.% Ni at room temperature, to 50-50 composition at temperatures where all specimens are paramagnetic. At these elevated temperatures Matthiessen's rule is obeyed over the entire range of compositions. General behavior may be interpreted in terms of dependence of s-d scattering upon temperature and composition. 5 ref.
(P15g 2-61; Ni, Pd)

85-P. Studies on the Magnetic Anisotropy Induced by Cold Rolling of Ferromagnetic Crystal. Pt. 1. Iron-Nickel Alloys. Soshin Chikazumi, Kenzo Suzuki and Hiroko Iwata. *Physical Society of Japan, Journal,* v. 12, Nov. 1957, p. 1259-1276.

11 ref. (P16, 3-68; Fe, Ni)

86-P.* Lattice and Electronic Specific Heats of Copper and Silver. K. G. Ramanathan and T. M. Srinivasan. *Scientific and Industrial Research, Journal,* v. 16B, July 1957, p. 277-279.

Variation of atomic heats of Cu and Ag were investigated in the liquid helium range of temperature and results compared with those of other researchers. 10 ref. (P12r; Cu, Ag)

87-P.* Cold Rolling of Extra-Hard Carbon Steel and Its Influence on Heat Treatments Involving Quenching. M. Massin. *Sheet Metal Industries,* v. 34, Nov. 1957, p. 847-857.

Apparatus and technique based on thermal analysis for the determination of internal or latent energy produced by cold rolling strip. Observation on high-carbon cold rolled steel with thermal analysis as a function of time. Study of the variation of latent energy liberated before and after alpha-gamma transformation and its relation to cold rolling conditions and extent of work hardening. (To be concluded.) 8 ref. (P12a, F23, 1-54; CN, 4-53)

88-P. Porosity in Formed Titanium. R. A. Wood, D. N. Williams, H. R. Ogden and R. I. Jaffee. Battelle Memorial Institute. *U. S. Office of Technical Services,* PB 121628, May 1957, 42 p. $1.25.

A new type of material failure called "strain-induced porosity" has been found in parts formed of commercial-purity Ti. The phenomena were marked by surface pitting and internal voids formed in areas of the part which had been highly strained.
(P10m, 3-68; Ti, 9-68)

89-P. Physical Properties of Titanium and Titanium Alloys. W. J. Lepkowski and J. W. Holladay. Battelle Memorial Institute. *U. S. Office of Technical Services,* PB 121629, July 1957, 87 p. $2.25.

(P general; Ti)

90-P. (French.) **Nonmagnetic Cast Iron.** Zbigniew Tyszko. *Fonderie,* v. 140, Sept. 1957, p. 411-421.

Theoretical point of view. Magnetic properties of a cast iron depend upon the structure of its metallic matrix. Ni and Mn, by opening the alpha loop, decrease the Curie temperature of the steel and make it possible to get stable austenite. Industrial importance of nonmagnetic cast iron. The iron is alloyed with either Ni and Mn or with Mn only. The best quality is obtained with Fe-Mn and Fe-Al systems. 10 ref.
(P16, 2-60; CI-q, Ni, *Mn, Al*)

91-P. (German.) **Heat Transfer of Welded and Soldered Joints.** H. Komossa. *Kaltetechnik,* v. 9, Sept. 1957, p. 279-281.

Heat conductivity of welded and soldered joints corresponds to that of the parent material. 10 ref.
(P11k, 7-51, 7-52)

92-P. (German.) **Electrical Resistance and Supraconductivity of Vapor Deposited Gallium.** Friedhold Baumann. *Nachrichten der Akademie der Wissenschaften in Gottingen. IIa. Mathematisch-Physikalisch-Chemische Abteilung,* no. 15, 1956, p. 285-295.

12 ref. (P15; Ga, 8-72)

93-P. (German.) **Generalized Method for Treatment of Transport Phenomena in Metals and Semiconductors.** Dieter Dorn. *Zeitschrift für Naturforschung,* v. 12a, Sept. 1957, p. 739-749.

14 ref. (P15, EG-j)

94-P. (German.) **Theory of Ferromagnetism. Pt. 2. The Heisenberg-Model.** Klaus Meyer. *Zeitschrift für Naturforschung,* v. 12a, Oct. 1957, p. 797-804.

12 ref. (P16)

95-P. (Russian.) **Analysis of Magnetic Structure.** S. V. Vonsovskii and M. N. Mikheev. *Zadovskaya Laboratoriya,* v. 23, no. 10, 1957, p. 1221-1226.

53 ref. (P16)

96-P. (Czech.) **Measurements of Relative Mobility of Cations in Three Component Silicate Fluid Solutions.** V. I. Malkin. *Hutnické Listy,* v. 12, Nov. 1957, p. 985-989.

Measurement of the cation transmission number serves as an index of metallurgical reaction kinetics particularly in molten slag reactions. 9 ref.
(P12; RM-q, Si, Na, K, Ca)

97-P.* (German.) **Electrical Conductivity of Aluminum.** K. R. Vassel. *Aluminium,* v. 33, Dec. 1957, p. 781-782.

Aluminum for conduction of electricity requires special measures in producing and semifinishing and in adherence to specifications. Twenty-five elements were studied for their action on conductivity. They can be divided into two groups differing in electron structures. D-elements having fully filled or no d-shell increase the atomic resistance. 9 ref.
(P15g, 2-60; Al)

98-P. (Russian.) **Influence of Technological Factors Upon Magnetic Properties of Cold Rolled Transformer Steel.** M. M. Ioffe, A. G. Petrenko and G. F. Chub. *Stal',* v. 17, Oct. 1957, p. 936-940.

Relationship between Si and carbon contents, treatment of the liquid steel under vacuum, annealing temperature under vacuum, magnetic properties of the transformer steel. 3 ref. (P16, 2-60, 1-73; ST, SGA-r)

99-P.* Work Function of the (110) Face of a Tungsten Single Crystal and Positive Surface Ionization of Sodium on This Face. G. N. Shuppe, E. P. Sytaia and R. M. Kadyrov. *Academy of Sciences of the USSR, Bulletin, Physical Series,* v. 20, no. 10, p. 1035-1043. (Columbia Technical Translations.)

23 ref. (P15; W, 14-61)

100-P. Metals for the Nuclear Age. Pt. 2. Beryllium. *Columbia-Southern Chemicals,* v. 2, no. 3, Fall, 1957, p. 9-11.

Nuclear properties; extraction of Be; potential applications outside nuclear energy field.
(P18, C general; 17-57; Be)

101-P.* Viscosity of Lead, Tin and Their Alloys. W. R. D. Jones and J. B. Davies. *Institute of Metals, Journal,* v. 86, Dec. 1957, p. 164-166.

The decrease of viscosity with increase of temperature is uniform, and the relationship between viscosity and temperature is that expected from Andrade's equation, except near the freezing point, where there is a deviation and viscosity increases rapidly. There are marked changes in the slope of the viscosity-composition curves at alloy contents corresponding to changes in constitution. 9 ref. (P10f; Pb, Sn)

102-P.* Electron Irradiation of Copper Near 10° K. J. W. Corbett, J. M. Denney, M. D. Fiske and R. M. Walker. *Physical Review,* v. 108, Nov. 15, 1957, p. 954-964.

The resistivity change induced by electron irradiation of zone-refined Cu maintained at ~10° K. has been measured over the range of bombarding electron energies from 0.70 to 1.37 Mev. The cross section for damage production is shown to be insensitive to the choice of the shape of the displacement probability function for this energy range. Isochronal and isothermal annealing studies of irradiations performed at 1.37 Mev. are described. The isothermal annealing curves are not amenable to analysis in terms of a single simple rate process, but seem to require a multiplicity of processes. 24 ref. (P15g, P18j, 2-67; Cu)

103-P.* Differential Cross Section for 3.8 Mev. Neutrons Scattered From Zirconium and Molybdenum. H. S. Hans and S. C. Snowdon. *Physical Review,* v. 108, Nov. 15, 1957, p. 1028-1031.

The differential cross sections for the scattering of 3.7-Mev. neutrons from Zr and Mo have been measured in a ring geometry by using a Bonner-type scintillation detector. The measurements were taken over an angular range of 124° between 18° and 142°. Angular resolution effects have been removed by iteration. Multiple scattering effects have been removed by a Monte Carlo-type calculation. 12 ref.
(P18j, 2-67; Zr, Mo)

104-P.* Precise Measurements of the Density of Mercury at 20° C. Pt. 1. Absolute Displacement Method. A. H. Cook and N. W. B. Stone. *Royal Society of London, Philosophical Transactions,* v. 250, Nov. 28, 1957, p. 279-323.

Measurement of density in units of length and mass probably correct to one ppm. Densities of four samples of Hg were measured by finding mass of Hg displaced by an accurately formed cube of tungsten carbide sintered with Co. 38 ref.
(P10a; Hg)

105-P.* Accomplishments and Limitations of Solid-State Theory. Harvey Brooks. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 44-81.

Success of solid-state theory in explaining in qualitative and quantitative terms the physical properties of solids. 40 ref.
(P general, M general, N general)

106-P. Surface Phenomena. Robert Gomer. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 216-266.

Review of surface structure, friction, adhesion, adsorption, catalysis, corrosion and electron emission. 38 ref. (P13, P15k, R general, Q9p)

107-P. Theoretical Basis of Magnetic Phenomena. J. E. Goldman. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 267-301.

17 ref. (P16)

108-P. Physics of Magnetic Materials. R. M. Bozorth. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 302-335.

Physics of ferromagnetic Fe-Si alloys, Fe-Ni alloys and nonmetallic ferrites. Structure of atoms and interatomic forces that cause ferromagnetism, antiferromagnetism and ferrimagnetism. 33 ref. (P16, M25)

109-P. Physics of Semiconductors. K. Lark-Horovitz and V. A. Johnson. Paper from "Science of Engineering Materials". John Wiley & Sons, Inc., p. 336-392.

(P15; EG-j)

110-P.* (French.) **Effects of Radiation on the Physical Properties of Metals.** J. Goens. *Revue de la Mécanique,* v. 3, Oct. 1957, p. 140-152.

Radiation can damage reactor components by three different mechanisms: interaction of products of fission with atoms of crystal lattice of the nuclear fuel; elastic collisions of neutrons with atoms of a crystal lattice; effects of ionization due to products of fission, to atoms displaced in lattices, and to beta and gamma rays. These mechanisms cause structural defects affecting properties of parts subjected to radiation, causing appearance of vacancies and interstitial atoms, of thermal spikes, and of atoms of chemical types not originally present in crystal, and modifying bonds between atoms of the lattice. Mechanical and physical properties of structural materials are greatly modified and fissionable metals, in some cases, undergo considerable change in dimension. Reactor permitting study of above phenomena is being designed for Belgian Center for Nuclear Studies. (P general, Q general, M25, 2-67)

111-P. (Hungarian.) **Technology of Production of Ferromagnetic Materials for High Tension Equipment. Pt. 2. Theory.** Ernö Neuhöffer. *Kohaszati Lapok,* v. 12, Nov. 1957, p. 455-459.

6 ref. (P16, T1; SGA-n)

112-P. (Russian.) **Solubility of Magnesium in Cast Iron.** A. F. Landa. *Liteinoe Proizvodstvo,* Aug. 1957, p. 27-29. (Also Henry Brutcher Translation no. 4070, Altadena, Calif.)

In relation to formation of spheroidal graphite. 17 ref.
(P12e, E25q; CI-r, *Mg*)

113-P. (Book.) **Metal Powder Association, Proceedings, 13th Annual Meeting,** v. 2, 1957, 204 p. Metal Powder Assoc., 130 W. 42nd St., New York 36, N. Y.

Collection of six papers read at Chicago, Apr. 30 to May 1, 1957, covering ferrites and electronic cores. Papers abstracted separately.
(P16, H general, T1; Fe)

Q Mechanical Properties and Tests

199-Q.* Crystallographic Characteristics of Fracture in Magnesium Single Crystals. R. E. Reed-Hill and W. D. Robertson. *Acta Metallurgica,* v. 5, Dec. 1957, p. 728-737.

Examination of the fracture mechanism in Mg has been made using single crystals strained in tension parallel to the basal plane. Fracture in a twin (parting) was observed as the primary mode of failure. In the temperature range 25-286° C., fractures occurred primarily in (3034) twins, while at −190° C. the habit plane of fracture was (1124). The low ductility of Mg strained in tension parallel to the basal plane is explained in terms of the fracture mechanism. 9 ref. (Q26, Q23p; Mg, 14-61)

200-Q. The Effect of Pickling and Anodizing on the Fatigue Properties of 2L40 and D.T.D. 683 Aluminium Alloys. J. M. Finney. *Australian Aeronautical Research Laboratories,* Report ARL/SM-255, July 1957, 33 p.

14 ref. (Q7, L12g, L19, 3-70; Al)

201-Q. Better Tests for Brittle Fracture. H. J. Nickols. *Canadian Metalworking,* v. 20, Dec. 1957, p. 34-36.

At present no test meets all requirements needed. Must first decide whether initiation or propagation of brittle fracture is more important in service failures.
(Q26s, 1-54, 2-60; ST)

202-Q.* Properties of Some Silicon-Molybdenum Steels. A. S. Kenneford. *Iron and Steel Institute, Journal,* v. 188, Jan. 1958, p. 16-22.

Heat treatment and mechanical properties. These steels, owing to their small volume changes on transformation, are resistant to thermal stress-cracking and also show great resistance to softening after tempering up to about 550° C. They also exhibit good ductility and impact value after tempering to give tensile strengths in the neighborhood of 120 tons per sq. in.
(Q general, 2-64; AY, *Si, Mo*)

203-Q.* Elastic Properties of Yttrium and Eleven of the Rare Earth Elements. J. F. Smith, C. E. Carlson and F. H. Spedding. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1212-1213. (CMA)

The elastic properties of all the lanthanons were studied except promethium, europium and thulium. Data for sonic velocity, density, elastic moduli (shear and Young's), Poisson's ratio and compressibility are tabulated. Lanthanum, samarium and ytterbium deviate from the linear trend in shear modulus, while Ce and Y deviate from the linear trend in compressibility. Oxygen impurity may explain the behavior of La. 5 ref. (Q21; EG-g)

204-Q.* Temperature Dependence of the Tensile Properties of Vanadium. J. W. Pugh. *Journal of Metals,* v. 9, *AIME Transactions,* vol. 209, Oct. 1957, p. 1243-1244. (CMA)

Arc-melted V ingots were hot rolled and then cold rolled to sheet, from which tensile specimens were cut in the rolling direction. Data on tensile and yield strengths, % elongation, strain-hardening and strain rate sensitivity were obtained at 300, 500, 700, 1000 and 1300° C. The temperature dependence of the tensile properties of V is typical of body-centered cubic metals, and is particularly sensitive at low temperatures. Many phenomena indicate strain-aging behavior. 10 ref.
(Q27a, 2-61, N7e; V)

205-Q.* Tensile Deformation of Aluminum as a Function of Temperature, Strain Rate and Grain Size. R. P. Carreker, Jr., and W. R. Hubbard, Jr. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1157-1163.

Investigation of tensile properties of two lots of high-purity Al annealed at different temperatures to produce variations in grain size and tested at temperatures ranging from 20 to 880° K. Relationship of tensile properties to temperature, grain size and strain rate. 21 ref.
(Q27, 2-61, 2-59, 3-68; Al)

206-Q.* Some Observations on 855° F. Embrittlement. G. F. Tisinai and C. H. Samans. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1221-1226.

Effects of various preheat treatment, cold rolling, decarburization and nitrogen level on hardening and embrittlement of 24 to 30% Cr steels held at temperatures near 885° F. for 24 hr. Hardness differences found and possible theoretical explanation. 15 ref.
(Q26s, Q29n, 2-64; SS, *Cr*)

207-Q.* Sand Cast Magnesium. Rare Earth Metal-Zirconium Alloys. T. E. Leontis and D. H. Feisel. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1245-1252.

Sand castings of Mg alloys containing rare earths and various amounts of Zr following heat treatment were subjected to tensile tests at 70, 400 and 600° F., and 100-hr. creep limits were determined at 400 and 600° F. Effects of Zr, didymium, Ce, mischmetal and Th additions on grain size and mechanical properties. 17 ref.
(Q27a, Q3m, 2-61; Mg, *Zr, EG-g*)

208-Q* Notch Tensile Properties of Selected Titanium Alloys. E. P. Klier and N. J. Feola. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1271-1277. (CMA)

Six alloys (Ti-5Al-2.5Sn, Ti-6Al, Ti-7Al-3Mo, Ti-4Al-4Mn, Ti-8Mn and Ti-15Cr) were prepared and contaminated with carbon, oxygen and nitrogen for tensile and notch-tensile testing from 75 down to −320° F. As single or combined contaminants increased, notch sensitivity was induced at a contaminant level which depended on the temperature and, in the notch-tensile tests, on the strength level. The critical strength level was in the 140,000-160,000-psi. range. Contamination limits for producing embrittled conditions were established. 7 ref. (Q27d; Ti)

209-Q.* Creep of Al-Cu Alloys During Age Hardening. Ervin E. Underwood. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1182-1189.

High-purity polycrystalline alloys of Al with 1 to 4% Cu were subjected to creep tests over a temperature range of 200 to 540° C. and hardness, X-ray and tensile tests performed. Creep tests made within both single and two-phase region of the equilibrium diagrams. Effect of aging on minimum creep rate determined. 24 ref.
(Q3, N7a, 2-61; Al, *Cu*)

210-Q.* Grain Boundary Deformation in Fine-Grained Electrolytic Magnesium. S. L. Couling and C. S.

(*)Articles Available Through Photocopy Service; See Coupon, p. 63.

Roberts. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1252-1256.

Specimens of completely recrystallized extruded electrolytic Mg were tested at 600° F. under stresses of 750, 500, 400 and 300 psi. with additional tests at 500 and 650° F. A grid technique was used in measuring grain boundary displacements. Measurement of grain boundary migration and number of boundary shears enabled calculation of strain localized at grain boundaries. Deformation found to be two-stage process involving alternate boundary shearing and migration. Explained by alternation of anelastic boundary shears with capture of these shears when boundaries migrate to new position. Repetition leads to cyclic process. 28 ref. (Q24m, M27f; Mg)

211-Q. **Fatigue Properties of Gray Iron.** Franz R. Brotzen and John F. Wallace. *Machine Design,* v. 29, Dec. 12, 1957, p. 154-158.

12 ref. (Q7a; CI-n)

212-Q.* **Zirconium-Tin Alloys.** R. F. Smart. *Metal Industry,* v. 91, Dec. 27, 1957, p. 535-539.

Zr-Sn system; creep resistance; tensile properties, effect of heat treatment on tensile properties; corrosion resistance of Zircaloy 1, 2 and 3; welding of Zr-Sn alloys. 11 ref. (Q general, R general; Zr, *Sn*)

213-Q.* **Measuring Hardness.** R. S. Marriner and F. C. P. Mason. *Metal Industry,* v. 91, Dec. 27, 1957, p. 539-540.

A new deadweight indenting machine, using a 136° pyramid indentor and standard loads of 30, 50, 100 and 120 kgf. has been designed and constructed and is accurate to ±5 D.P.N. units. (Q29, 1-53)

214-Q. **Radioactive-Tracer Technique for Studying Grinding Ball Wear.** M. Pobereskin, N. M. Ewbank, Jr., G. D. Calkins, A. Wesner and J. E. Campbell. *Mining Engineering,* v. 9, *AIME Transactions,* v. 209, Dec. 1957, p. 1356-1358.

6 ref. (Q9p, W15n, 1-59; ST)

215-Q.* **Fatigue Properties of Aluminium Alloys.** G. Forrest. *Sheet Metal Industries,* v. 34, Nov. 1957, p. 831-845.

Review of literature. Fatigue curves for a variety of Al alloys and the effects of heat treatment, work hardening, aging, notched specimen, mean stress, residual stress, surface finish, corrosion and metallurgical factors such as ingot size, grain size, test direction, heat treatment and mechanical working. 37 ref. (Q7a, 3-70; Al)

216-Q.* **Mechanical Testing of Thin Mild-Steel Sheet and Strip.** M. L. Hughes. *Sheet Metal Industries,* v. 35, Jan. 1958, p. 5-18, 22.

Production of cold reduced tinplate stock and its physical properties, together with hardness tests, micro-indentation tests, bend tests, tests for stiffness and "springiness", the "bend factor", variation in sheet springiness, springback, cupping tests, tensile tests and surface finish. (Q general, Q23q; CN, 4-53)

217-Q.* **Micro-Hardness Testing.** R. Wall. *Sheet Metal Industries,* v. 35, Jan. 1958, p. 61-62.

A review of practical experience and a suggested testing procedure. Errors in microhardness testing are generally caused by poor preparation of the test specimen, vibration of the testing machine, careless measurement of impressions and insufficient experience of the operator. (Q29q, 1-54)

218-Q.* **Deformation Studies in Metal Working Processes.** H. P. Tardif. *Steel Processing and Conversion,* v. 43, Nov. 1957, p. 626-632, 643-644, 650.

Comprehensive review of experimental and analytical method used to observe deformation of metals; results emphasize production of macro-inhomogeneities and/or microinhomogeneities during deformation. Methods which have been used in studying deformation of metals during extrusion, rolling, drawing or tensile loading include reference grids and markers, recrystallization phenomena, tensile strength, hardness, plasticine models, X-ray diffraction and metallographic studies. 127 ref. (Q24, 1-53)

219-Q. **High-Temperature Brittleness in Titanium Alloys.** N. Makrides and W. M. Baldwin, Jr. Case Institute of Technology. (Wright Air Development Center.) *U. S. Office of Technical Services,* PB 131381, June 1957, 29 p. $.75.

Studies of strain aging phenomena, high-temperature brittleness and stress-rupture behavior. (Q26s, Q3m, N7e; Ti)

220-Q. (French.) **Results of Experiments on the Forming of a Bessemer, BTM Steel Made With Oxygen-Enriched Air.** M. Thiault and J. Stremsdoerfer. *Institut de Recherches de la Siderurgie,* Series A, no. 170, Sept. 1957, 107 p.

Operations studied are rolling of sheet and plate for stamping and enameling, manufacture of wire and bolts, and welding. Bessemer steel is as good as openhearth steel for a great number of uses. However, openhearth steel is better for stamping. (Q23q, 17-57; ST-e, ST-g)

221-Q. (French.) **Steels for Pipe at Temperatures Above 600° C.** J. Ivernel. *Revue du Nickel,* v. 23, Sept. 1957, p. 61-71.

Research on the properties of austenitic steels at high temperatures; mechanical tests; experiments on corrosion. 12 ref. (Q general, R general, 2-62; ST, 4-60)

222-Q.* (German.) **Measurements of Internal Friction on Slightly Strained Iron-Carbon Alloys.** W. Wepner. *Acta Metallurgica,* v. 5, Dec. 1957, p. 703-710.

The time dependence of precipitation was investigated in a specimen of pure iron to which less than 0.02% C. was added, with or without previous slight deformation up to 5% strain. The undeformed specimen showed the well-known time law of the precipitation of carbide; the specimen strained 5% followed Cottrell's relation for the movement of carbon to dislocations. 12 ref. (Q22, N7, 3-68; Fe, *C*)

223-Q. (German.) **Application of Nodular Cast Iron in Machine Tool Fabrication.** Roland Fervers. *Industrie-Anzeiger,* v. 79, Sept. 24, 1957, p. 3-8.

Superior properties of nodular compared with gray cast iron. 9 ref. (Q general, W25, 17-57; CI-r)

224-Q. (German.) **Wear Behavior of Grinding Wheels.** G. Pahlitzsch and H. O. Erast. *Industrie-Anzeiger,* v. 79, Oct. 4, 1957, p. 1193-1199.

Wear depends upon the cutting speed and the grinding wheel hardness. 10 ref. (Q9, W25-s)

225-Q. (German.) **Notch Tensile Test and Its Application in Predicting Brittle Fracture. Pt. 3.** H. Flössner and K. Matthaes. *Schweizer-Archiv,* v. 23, Sept. 1957, p. 292-304.

65 ref. (Q27d, Q26s)

226-Q.* (Italian.) **Influence of Silicon Content and of the Presence of Manganese on the Properties of G-AS 13 UNI 3047 Alloys.** D. Gualandi. *Alluminio,* v. 26, Dec. 1957, p. 525-535.

Tests on sand and permanent mold castings with and without structural modification caused by salts showed that alloy containing 12% Si and 0.4% Mn had best over-all properties. 5 ref. (Q general, 2-60; Al, *Si, Mn,* 5-60, 5-63)

227-Q. (Japanese.) **Study of Aluminum-Magnesium Alloys Based on Super-Pure Aluminum. Pt. 3.** Yuzo Nakamura, Takuji Okugawa and Noboru Fukuchi. *Light Metals (Tokyo),* v. 7, Nov. 1957, p. 34-39.

Earing in deep drawing tests was investigated with alloy sheets containing 99.99% Al. 10 ref. (Q23q, G4b, 1-54; Al, *Mg*)

228-Q. (Japanese.) **Improvement of Heat Resistance of Aluminum Alloys by Addition of Zirconium. Pt. 3.** Yoshitsugu Mishima and Naoaki Takahashi. *Light Metals (Tokyo),* v. 7, Sept. 1957, p. 50-54.

Heating tests were carried out on casting alloys with softening behavior compared by measurements of Vickers hardness. (Q29n, 2-60; SGA-h, *Zr,* Al)

229-Q. (Japanese.) **Sintered Aluminum Products.** Masataka Sugiyama and Hisashi Suzuki. *Light Metals (Tokyo),* v. 7, Nov. 1957, p. 56-63.

Density, tensile strength, hardness and heat resisting properties of sintered compacts prepared from commercial flake powders and powders produced by atomization. 13 ref. (Q general, P general; Al, 6-72)

230-Q. (Japanese.) **Mechanical Properties of Binary and Ternary Zirconium Alloys.** Yoshitsugu Mishima and Shigeju Morikawa. *Light Metals (Tokyo),* v. 7, Sept. 1957, p. 64-69.

3 ref. (Q29n, Q27a, Q5k; SGA-h, Zr)

231-Q. (Russian.) **Summary of 40 Years of Work in Mechanical Testing in the U.S.S.R.** N. N. Davidenkov. *Zavodskaya Laboratoriya,* v. 17, no. 10, 1957, p. 1245-1265.

274 ref. (Q general, 1-54)

232-Q.* **Low-Temperature Deformation of Copper Single Crystals.** T. H. Blewitt, R. R. Coltman and J. K. Redman. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 179-207.

Single crystals of Cu were deformed at 4.2 and 77.3° K. At 4.2° K., after a large strain produced by normal slip, jerky flow, called discontinuous slip, occurs. From the study of reactor-irradiated crystals, it was deduced that a packet of 30 slip lines, each containing 10 dislocations, was released to form each jerk of the discontinuous flow. For samples of certain orientation the region of discontinuous flow was followed by a region of deformation twinning. The fact that deformation twinning was taking place was verified by X-ray methods. 6 ref. (Q24a, Q24b, 2-63; Cu, 14-61)

233-Q.* **Observations on Slip in Aluminum.** T. S. Noggle and James S. Koehler. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 208-214.

Experiments on 99.99% pure Al single crystals. The deformation was performed at helium temperature, at liquid-nitrogen temperature and at room temperature. At helium

temperature the curve above 0.1 shear strain is approximately straight; at nitrogen temperature the curve begins to show stage III; at room temperature the entire region seems to be in stage III of work hardening.
(Q24a, 2-63; Al-a, 14-61)

234-Q.* Effect of Pressure on the Plastic Deformation of Ni and Al. C. S. Barrett. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 238-240.

Increasing the pressure increases the flow stress. If pressure is decreased, flow stress decreases. There is a slight transient immediately upon reloading after the pressure is changed, but there is clearly a difference in flow stress. In all cases the crystal fractured by necking down; the type of fracture did not change under pressure.
(Q24, Q26, 3-74; Al, Ni)

235-Q.* Yield Strength of Binary Alloys. Hideji Suzuki. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 361-390.

Yield strength depends on the interaction force between sources as well as on the force required to tear a dislocation from its locked site. The yield strength determined in experiment is usually the transition point at which the tangent in a stress-strain curve decreases considerably. The yield strength in theory therefore is reasonably determined from the theoretical stress-strain curve. 23 ref. (Q23b, M26b)

236-Q.* Deformation of Alloy Single Crystals. J. Garstone and R. W. K. Honeycombe. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 391-405.

With Al-3.5% Cu crystals, easy glide only occurs in the supersaturated solid solution when deformed at a low temperature, so that aging does not take place during the deformation. If the crystals are aged to peak hardness or overaged, before deformation, then the subsequent stress-strain curve shows normal parabolic hardening. 18 ref.
(Q24, N7a; Al, *Cu*)

237-Q.* Yield Points in Al and Ni Single Crystals. C. S. Barrett. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 419-422.

Investigation of the yield points that appear upon reloading after prior plastic deformation and unloading. The yield point appears only if there has been previous plastic flows; the magnitude of the yield point effect increases with the flow stress at the time of unloading; the specimen must be subjected to a reduced load to show the effect. (Q23b, 3-68; Al, Ni, 14-61)

238-Q.* Behavior of Metals Under Reversed Stresses. N. F. Mott. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 458-478.

Current theory of work hardening of metals, especially with reference to their behavior under cyclic stress. A model is proposed which insures that the Frank-Read sources responsible for slip lines should not generate dislocations of the opposite sign with consequent work-softening when the stress is reversed. Model also gives explanation of the existence of fine and coarse slip. Friedel's model of work hardening is extended to explain the formation of multiple slip bands. A theory for the formation of a fatigue crack is proposed. 36 ref.
(Q23a, Q24a, M26b)

239-Q.* Deformation and Fracture of Silicon. W. T. Read, Jr., and G. L. Pearson. Paper from "Dislocations and Mechanical Properties of Crystals". John Wiley & Sons, Inc., p. 537-544.

Purpose of the investigation was to study the stress-strain behavior of perfect crystals in the plastic range. The mechanism of plastic deformation in Si and the dominant effect of impurities even in the purest Si now available. The behavior is strikingly similar to that of iron containing carbon. There is a pronounced yield point at the beginning of plastic flow, the lower yield stress being less than half the upper yield stress. 8 ref.
(Q24, Q26; Si)

240-Q.* (German.) **Fatigue Studies on Bonded Aluminum Structural Parts.** K. F. Hahn and H. D. Steffens. *Aluminium,* v. 33, Dec. 1957, p. 783-788.

Behavior of bonded extruded sections at high loads was studied on fatigue-testing machine (rotating bend) on specimens one meter long. Use of flexible interlayers gives higher fatigue limits than straight bonding or riveting. Prevention of sudden changes in resistance moment under flexures is needed when shaping parts to be bonded. 6 ref.
(Q7; Al, 7-58)

241-Q. (German.) **Formation of Twin Crystals and Embrittlement of Steels.** Albert Kochendorfer and Herbert Scholl. *Archiv für das Eisenhüttenwesen,* v. 28, Aug. 1957, p. 483-488.

Microscopic and electron microscopic examinations of impact fractured specimens show that three kinds of deformation twins exist—"A" twins, wide with irregular boundaries, "B" twins, narrow with smooth parallel boundaries, "C" twins, narrow, smooth and parallel boundaries but submicroscopic. Twin formation is only a secondary phenomenon and does not affect ductility of the material. 20 ref.
(Q24b, Q26s, M21; ST)

242-Q. (German.) **Properties of Steel C45 Under Deformation Processes and as Upsetting and Shearing in Relation to Temperature and Velocity of Deformation.** Werner Lueg and Hans-Günter Mueller. *Archiv für das Eisenhüttenwesen,* v. 28, Aug. 1957, p. 505-516.

In temperature range between 700 and 1100° C. the ductility and shear strength of a steel with 0.46% C. was tested and rate of deformation velocity and forces were recorded continuously. Ductility and shear strength correspond to the shape of the resulting curve. Even under elevated temperatures a work hardening process takes place, which can be suppressed or supported by varying deformation velocities. The ductility in relation to the velocity is expressed in an exponential function. For the relation between ductility and shear strength a simplified formula was developed. 12 ref.
(Q23p, Q2g, 2-62; ST)

243-Q. (German.) **Slip Textures on the Surface of Fatigue Tested High-Purity Aluminum.** Max Hempel and Angelica Schrader. *Archiv für das Eisenhüttenwesen,* v. 28, Sept. 1957, p. 547-556.

Multicrystalline high-purity Al was subjected to fatigue tests under various load conditions. Specimens were then investigated under light microscope and electron microscope. Fatigue strength is almost identical with yield strength of annealed Al. Specimens showed more hardening after increasing strain and length of test. Strong grain-boundary slip textures appear, increasing in frequency and variety with increasing length of time and increasing strain. The lower limit for the appearance of slip textures is determined. 20 ref. (Q7, M26c; Al-a)

244-Q. (German.) **Fatigue Testing.** W. Weibull and F. K. G. Odqvist. *Draht,* v. 8, Oct. 1957, p. 429-431.

A report on an international colloquium (International Union of Theoretical and Applied Mechanics) on fatigue testing held in Stockholm in May 1955. The proceedings and speeches were published in book form. (Q7)

245-Q. (German.) **Testing of Thin Sheet by Bending.** H. Cross. *Fertigungstechnik,* v. 7, Sept. 1957, p. 417-420.

New equipment eliminates faults of older methods. 4 ref. (Q5, 1-53)

246-Q.* (German.) **Effect of Hydrogen Content on Mechanical Properties of Converter Steels Blown With Oxygen and Steam.** Alfred Krüger and Eugen Schmidtmann. *Stahl und Eisen,* v. 77, Dec. 26, 1957, p. 1868-1873.

Mechanical properties in normalized, artificially embrittled or rolled condition. Transition temperatures of notch toughness and behavior in subsequent treatment of 20 rimmed or killed steels blown with oxygen and steam. Comparison with rimmed and killed basic bessemer, open-hearth or similar steels blown with oxygen enriched air. 3 ref.
(Q general; ST-g)

247-Q. (German.) **Statistical Analysis of Toughness Tests on Unnotched Impact Bending Test Bars Made From Steels of High Hardness.** Karl Bungardt, Otto Mülders and Wolfgang Spyra. *Stahl und Eisen,* v. 77, Dec. 26, 1957, p. 1878-1883.

10 ref. (Q6, Q29; ST)

248-Q. (Russian.) **Fatigue Strength of Bits Welded Automatically Under Flux.** L. A. Glikman and A. N. Babaev. *Metallovedenie i Obrabotka Metallov,* Oct. 1957, p. 37-43.

Endurance limit of the bits before and after welding. Effect of heat treatment and mechanical working upon endurance limit of welded bits. Decrease in endurance limit of the welded bits expained by deficiency of the welding process. 10 ref.
(Q7k, K1e, T6n)

249-Q. (Russian.) **Method of Measuring Dynamic Hardness of Metals.** E. I. Timofeev and L. A. Urvantsov. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1365-1368.

Device for measuring impact of steel ball on metal. 10 ref.
(Q29b, 1-53)

250-Q. (Russian.) **Measuring Indicators of Strength and Plasticity of Alloys During Crystallization Intervals.** I. I. Novikov and K. T. Matveeva. *Zavodskaya Laboratoriya,* v. 23, no. 11, p. 1369-1372.

New laboratory equipment for studying mechanical properties of alloys at temperatures higher than solidus. 19 ref.
(Q general, X29, 2-62)

251-Q.* Effect of Heat Treatment on the Creep and Creep-Rupture Behavior of a High-Purity Alpha Copper Aluminum Alloy at 300 and 500° C. J. P.

Dennison. *Institute of Metals, Journal*, v. 86, Dec. 1957, p. 177-181.

Effect of the treatment by which particular grain-sizes were achieved, as well as to effect of actual grain size before testing. At 300° C., where fine-grained specimens were the most resistant to rupture, and at 500° C., where those having coarse grain-sizes gave superior creep-rupture lives, recrystallization at a high temperature during preparation of the specimen resulted in an inferior performance in both creep and creep-rupture tests. 20 ref.
(Q3, 2-59, 2-64; Cu, *Al*)

252-Q. How Good Are Leaded Steels in Fatigue? G. W. Brock and G. M. Sinclair. *Iron Age*, v. 181, Jan. 9, 1958, p. 59-62.
(Q27, Q7, 2-60; ST, *Pb*)

253-Q. New Standard Hardness Testing Machine. R. S. Marriner and F. C. P. Mason. *Machinery*, v. 91, Nov. 22, 1957, p. 1225-1230.
New machine employing a 136° pyramid diamond indenter to calibrate hardness test blocks used in verification of industrial hardness testers. (Q29c, 1-53)

254-Q. Stresses Alter Hardness. S. K. Setty, J. T. Lapsley and E. G. Thomsen. *Mechanical Engineering*, v. 79, Dec. 1957, p. 1127-1129.
(Q29n, Q25, 3-66; ST)

255-Q.* Coefficients of Flat-Surface Friction. A. O. Schmidt and E. J. Weiter. *Mechanical Engineering*, v. 79, Dec. 1957, p. 1130-1136.

Tests conducted on sliding friction between flat surfaces of ground cast iron, scraped cast iron or ground steel and aluminum bronze or cast iron. Effects of lubrication and wear on static coefficient of friction and estimation of kinetic coefficient of friction. 18 ref. (Q9p; CI, ST, Cu)

256-Q. Mechanical Springs—Materials, Finishes and Embrittlement. Lester F. Spencer. *Metal Finishing*, v. 56, Feb. 1958, p. 66-69.

Absorption of hydrogen gas in steel; manner in which this gas will cause damage; conditions under which damage will occur; method by which hydrogen is released during relief treatment. Several theories to explain the action of hydrogen in steel. 13 ref.
(Q26s; ST, SGA-b, *H*)

257-Q.* Niobium. Pt. 2. Properties and Applications. J. H. Rendall. *Metal Treatment and Drop Forging*, v. 25, Jan. 1958, p. 7-12.

Mechanical properties; use in atomic energy reactors; columbium in austenitic stainless steel in heat resisting alloys; future outlook. 14 ref. (Q general, W11p, 17-57; Cb, SS, AD-n)

258-Q. Hardness-Tensile Relationship for 7075 Aluminum Alloy. R. E. Kleint and George B. Mathers. *Nondestructive Testing*, v. 15, Nov-Dec. 1957, p. 348-350.

Alloys subjected to a variety of heat treatments to obtain a wide range of mechanical properties.
(Q27a, Q29n; Al)

259-Q. New Aluminum Forging Alloys. Warren Bomhardt. *Product Engineering*, v. 28, Dec. 23, 1957, p. 62-63.

Tensile strength in notched and standard specimen, ductility and corrosion characteristics of 7079 Al alloy compared to 7075 alloy.
(Q general, R general; Al, *Mg, Zn*, 4-51)

260-Q. Drawability of Titanium Defined. *Steel*, v. 141, Dec. 9, 1957, p. 179.

Effects of draw speed, thickness and temperature on drawability of Ti, draw pressure and relation to percentage of draw. (Q23q, G4; Ti)

261-Q. Friction and Wear Under Boundary Lubrication. B. Lunn. *Wear*, v. 1, Aug. 1957, p. 25-31.

Proposes that boundary film is a homogeneous plastic solid with plastic flow, proportional to shear strength of solid. Uses simplified hydrodynamic equations to construct simple diagram of frictional behavior under boundary conditions. Compares diagram to technical experience. 11 ref. (Q9p, 14-62)

262-Q. Wear of Cast Iron Machine Tool Slides, Shears and Guideways. H. T. Angus. *Wear*, v. 1, Aug. 1957, p. 40-57.
(Q9, W25; CI)

263-Q. Thermal Aspects of Galling of Dry Metallic Surfaces in Sliding Contact. Frederick F. Ling and Edward Saibel. *Wear*, v. 1, Oct. 1957, p. 80-91.
(Q9p, Q9q)

264-Q. Experiments on the Friction and Endurance of Various Surface Treatments Lubricated With Molybdenum Disulphide. A. A. Milne. *Wear*, v. 1, Oct. 1957, p. 92-103.

Phosphated and sulphided mild steel surfaces in association with different molybdenum disulphide formulations were rotated in contact and results presented in form of comparative data on friction and endurance. 9 ref.
(Q9n, Q9p; ST, NM-h)

265-Q. Wear in Cylinder Liners. K. Fursund. *Wear*, v. 1, Oct. 1957, p. 104-118.
(Q9, W11j)

266-Q. Survey of Possible Wear Mechanisms. John T. Burwell, Jr. *Wear*, v. 1, Oct. 1957, p. 119-141.
10 ref. (Q9)

267-Q. Fatigue Failures in Fatigue Machines. W. H. Munse. *Welding Journal*, v. 37, Feb. 1958, p. 54s-56s.

Welded flexural members subjected to many millions of cycles of loading may fail at relatively low maximum nominal stresses. (Q7)

268-Q. (English.) **Creep of Metals.** N. P. Allen. *Teknisk Ukeblad*, v. 104, Sept. 26, 1957, p. 779-787.

The way in which creep takes place and factors influencing rate of deformation; development of alloys specially resistant to creep at high temperatures. (Q3)

269-Q.* (French.) **Welded Joints of Ferritic and Austenitic Steels: Their Use in Heating Plants.** F. Zimmer. *Revue de la Mécanique*, v. 3, Oct. 1957, p. 162-174.

Because of the diverse physical and metallurgical characteristics of these steels, joints are subject to severe strains due to different coefficients of expansion; to decarburization of the ferritic steel; to corrosion fatigue in decarburized zone. Ten types of joints in which transition metals and other methods are used to reduce these harmful phenomena. (Q25, P12g, 2-60; SS, 7-51)

270-Q. (Japanese.) **Experimental Study on Static Strength of Perforated Strips and Riveted Joints of Commercially Pure Titanium.** Shoji Shimamura and Yusei Noguchi. *Journal of Mechanical Laboratory*, v. 11, Nov. 1957, p. 194-203.

Nine groups of specimens were tested under static tensile load to determine effect of ratio of hole diameter to plate width. 8 ref.
(Q27; Ti)

271-Q. (Russian.) **Influence of Phosphorus Content Upon Wear and Friction of Gray Cast Iron.** A. A. Olshevskii and M. M. Kantor. *Liteinoe Proizvodstvo*, July 1957, p. 14.
(Q9, 2-60; CI-n, *P*)

272-Q. (Russian.) **Fatigue Tests for Gear Wheels.** V. I. Rudnitskii. *Zavodskaya Laboratoriya*, v. 23, no. 11, 1957, p. 1383-1384.

Various factors affecting fatigue strength of gear wheels during bending. (Q7, T7a)

273-Q. (Spanish.) **Fatigue in Automotive Parts.** J. Garcia Martin. *Ciencia y Tecnica de la Soldadura*, v. 7, Nov-Dec. 1957, 16 p.

Role of part design, choice of metal, heat treatment and coatings in reducing fatigue tendencies. Fatigue in crankshafts, bearings, bolts, pins, springs and gears. 8 ref. (Q7, T21c)

R Corrosion

118-R.* Nature of Pitting Attack on Cast Iron Propellers and Preliminary Experiments on Its Prevention by Cathodic Protection. R. I. Higgins. *British Cast Iron Research Association, Journal of Research and Development*, v. 7, Dec. 1957, p. 129-143.

The incidence, form and distribution of this attack appear to be dependent, to some extent, on the tip speed of the propeller. Nature of pitting; evidence shows that the metal is removed by a corrosion process rather than by an erosion process. Attack can be prevented by cathodic protection by means of a sacrificial magensium anode which is attached to the propeller rather than the hull of the ship.
(R2j, R10d, T22h)

119-R.* Material Transport in Sodium Systems. Fred G. Haag. Paper from "Liquid Metals Technology", Pt. 1. Chemical Engineering Progress Symposium Series, p. 43-50.

Results of comprehensive investigation into cause and magnitude of material transport in flowing Na systems by use of radioactive tracer techniques. Transfer tests include capsule experiment and lube test with AISI 347 stainless steels as structural material. Effects of oxygen concentration, temperature gradient, time, velocity, reactor conditions and presence of migration inhibiting elements on the rate of transfer of radioactive isotopes, from stainless steel activated by exposure in reactor. 13 ref.
(R2a, 1-59; SS, *Na*, 14-60)

120-R.* Low-Cost Materials for Sodium Heat Transfer Systems. E. G. Brush and R. F. Koenig. Paper from "Liquid Metals Technology", Pt. 1. Chemical Engineering Progress Symposium Series, p. 59-65.

Results of laboratory scale tests with static and dynamic Na systems in which resistance of ferrite alloys to corrosive attack was investigated at temperatures up to 1000° F. Resistance of alloys with varying amounts of Cr to mass transfer attack by oxygen, decarburization and to diffusion bonding. 13 ref.
(R6m, R2a, T11, 17-57; *Cr, Na*, 14-60)

121-R.* Static and Dynamic Corrosion and Mass Transfer in Liquid Metal Systems. Leo F. Epstein. Paper from "Liquid Metals Technology", Pt. 1. Chemical Engineering Progress Symposium Series, p. 67-81.

Mechanism and rate-determining steps of static and dynamic corrosion and mass transfer where corrosion process is due essentially to solution of metal in the liquid. 51 ref. (R2a, T11; 14-60)

122-R. Corrosion Research in Progress. Effect of Dissolved Oxygen on Corrosion and on Cathodic Protection Requirements. G. A. Marsh and E. Schaschl. *Corrosion,* v. 13, Nov. 1957, p. 695t.

(R1, R10d)

123-R. Factors Other Than Mineral Content Which Influence the Corrosiveness of Cooling Water. E. H. Hurst. *Corrosion,* v. 13, Nov. 1957, p. 696t-700t.

8 ref. (R4c)

124-R. Non-Chemical Factors Affecting Inhibitor Selection and Performance in Air Conditioning Cooling Waters. Sidney Sussman. *Corrosion,* v. 13, Nov. 1957, p. 701t-710t.

5 ref. (R4a, R10b)

125-R. Inhibiting a Cooling Water Tower System. F. L. Whitney, Jr. *Corrosion,* v. 13, Nov. 1957, p. 711t-718t.

19 ref. (R10b, W10h)

126-R. Some Experiences With Sodium Silicate as a Corrosion Inhibitor in Industrial Cooling Waters. J. W. Wood, J. S. Beecher and P. S. Laurence. *Corrosion,* v. 13, Nov. 1957, p. 719t-724t.

10 ref. (R10b, R4)

127-R.* Thermochemical Study of Some Additives to Reduce Residual Fuel Ash Corrosion. W. E. Young and A. E. Hershey. *Corrosion,* v. 13, Nov. 1957, p. 725t-732t.

A theoretical study on V and Na, the two most objectionable elements occurring in residual fuel ash, and additives which might inhibit corrosion. Freezing point curves and thermal properties were calculated for mixtures of oxide or sulphate containing Mg, Al or Ca as well as Na or V compounds. Dissociation calculations were made and the following conclusions reached: Al compounds were most satisfactory of metallic additions because aluminum sulphate dissociates to corrosion-reducing oxide at temperatures only slightly above prevailing turbine inlet temperatures. 12 ref. (R7d, R10b)

128-R.* Corrosion and Adsorption Studies Using Sulfonate Inhibitors. A. H. Roebuck, P. L. Gant, O. L. Riggs and J. D. Sudbury. *Corrosion,* v. 13, Nov. 1957, p. 733t-738t.

Study of adsorption and desorption of sodium and amine salts of sulphonic acids by radioactive tracers. Corrosion inhibiting properties of these salts in hydrogen sulphide or carbon dioxide environment for steel specimens. Effect of concentration, solubility, molecular weight and extent of neutralization of sulphonic acid on corrosion inhibition. Mechanism of protective action by sulphonate inhibitors. 15 ref. (R10b, 1-59; ST)

129-R. Status of Downhole Corrosion in the East Texas Field. *Corrosion,* v. 13, Nov. 1957, p. 743t-746t.

Results of questionnaire survey. Extent, treating schedule and types of chemical inhibitors used and success in combatting oil well corrosion. (R2, R10b, T28)

130-R. Water Dependent Sweet Oil Well Corrosion Laboratory Studies. *Corrosion,* v. 13, Nov. 1957, p. 747t-749t.

Data reported on correlation between hole bottom pH and tubing life under various production conditions. (R4, T28p)

131-R.* Evaluation of Inhibitors for Corrosion Prevention in Engine Cooling System. Leonard C. Rowe. *Corrosion,* v. 13, Nov. 1957, p. 750t-756t.

Rotating specimen tests used to evaluate effectiveness of inhibitors such as sodium borate, sodium nitride, sodium benzoate, potassium dichromate, soluble oil, sodium mercaptobenzothiazole with various test media including tap water, ethylene-glycol-water mixtures with and without additional corrosive constituents for specimens of steel, Cu, brass, Al, cast iron and solder. Data on one-year room temperature static tests on 13 galvanic couples. 9 ref. (R10b; ST, Cu, Al, CI)

132-R.* Corrosion by Acetic Acid. *Corrosion,* v. 13, Nov. 1957, p. 757t-766t.

Summary of data and experience with use of various materials for storage and handling of refined glacial as well as dilute acetic acid. Common corrosion problems; laboratory and field corrosion test results; common types of failure; Al alloys, austenitic stainless steels and Cu alloys; their limitations and use; importance of minor contaminants and oxidizing or reducing nature of environment in choosing proper materials. (R7b; Al, SS, Cu)

133-R. Current Requirement for Cathodic Protection of Oil Well Casing. E. W. Haycock. *Corrosion,* v. 13, Nov. 1957, p. 767t-774t.

(R10d, T28)

134-R. Fundamentals of Electrode Processes in Corrosion. Milton Stern. *Corrosion,* v. 13, Nov. 1957, p. 775t-782t.

Effect of pH, oxygen concentration, environment, velocity, iron composition, heat treatment and galvanic coupling on corrosion rate explained in terms of the fundamental principles of activation, polarization and concentration polarization. 14 ref. (R1a)

135-R. Acetic Acid Salt Spray Test. J. H. Hooper. *Electroplating and Metal Finishing,* v. 10, Dec. 1957, p. 403-408.

A comparison with other methods of simulating service breakdown of protected metal surfaces. 8 ref. (R11j)

136-R.* Rustproofing Oils for Processing. Eugene R. Slaby. *Iron and Steel Engineer,* v. 35, Jan. 1958, p. 103.

Present-day slushing oils when correctly applied to sheet or strip steel can effectively safeguard surfaces against rust and corrosion; rust preventives permit shipment of coils without customary wrappings. (R10f; ST, NM-h, 4-53)

137-R.* Corrosion of Tinplate by Victoria Plum Syrup. F. W. Salt and J. G. N. Thomas. *Iron and Steel Institute, Journal,* v. 188, Jan. 1958, p. 36-45.

The syrup contains both inhibitors and accelerators of corrosion. Stannous tin inhibits the corrosion appreciably, but stannic tin slightly accelerates it. A number of possible organic inhibitors have been investigated in the plum syrup and two, caprylic and caproic acids, were found to give appreciable inhibition in the presence of 25 ppm. stannous tin. Caprylic acid alone in the plum syrup greatly increases the steel corrosion rate. 16 ref. (R7n, R10b; Sn, 8-62)

138-R. A Systematic Study of Corrosion in Magnesium Printing Plates. F. W. MacKenzie. *Process,* v. [illegible] Nov. 1957, p. 422-423.

(R6g, T9n; Mg)

139-R. Effect of Corrosion Preventives and Initial Barrier Wrappers on Preservation of Anti-Friction Bearings. L. H. Wagner. Rock Island Arsenal Laboratory. *U. S. Office of Technical Services,* PB 131262, May 1956, 51 p. $1.50.

(R3, R10e, T7d; ST, Cu)

140-R. (English.) **Review of Low Temperature Corrosion by Combustion Gases in Oil Burning Plant.** G. F. J. Murray. *Schweizer-Archiv,* v. 23, Sept. 1957, p. 280-292.

Experiments on the addition of alkaline additives to the fuel oil and into the flue gas stream. 2[illegible] ref. (R7k, R10c, T26q)

141-R. (French.) **The Oxidation of Billets.** J. Moreau and M. Cagnet. *Institut de Recherche de la Siderurgie,* Series A, no. 157, p. 1-23.

Study made by micrography, X-ray and electronic microprobe (Castaing). Structure and composition of oxides; contamination of the steel; kinetics of oxidation; influence of the temperature and the atmosphere of the furnace on the formation of oxides; reproduction of the oxidation in laboratory. (R1h, R2q; ST, 4-52)

142-R.* (German.) **Some Basic Problems of the Formation and Adherence of Scale on Iron.** H. Engell and F. Wever. *Acta Metallurgica,* v. 5, Dec. 1957, p. 695-702.

Some kind of Kirkendall effect occurs due to preferential diffusion of either metal or oxygen in an oxide layer during the scaling of metals. If the metal diffusion predominates, voids are formed between scale and metal, or the oxide layer is porous. Both these phenomena influence the mechanical adherence of scale on the metal and the kinetics of oxidation. In the case of preferential diffusion of oxygen there will be a compressed region at the boundary metal to oxide (if the oxide has a larger specific volume than the metal) which facilitates the peeling-off of the scale. 6 ref. (R2q, R1h; Fe)

143-R. (German.) **Corrosion Prevention in Petroleum Refining.** Werner Wisfeld. *Erdöl und Kohle,* v. 10, July 1957, p. 449-450.

(R10, T29n)

144-R. (German.) **Oxide Patterns Appearing on the Surface of Molten Cast Iron.** Osamu Madono. *Giesserei,* v. 44, Nov. 21, 1957, p. 714-718.

(R1h, CI, 14-60)

145-R. (German.) **Weldable Aluminum-Magnesium Alloys.** P. Brenner. *Schweissen und Schneiden,* v. 9, Nov. 1957, p. 483-492.

Corrosion resistance of welded and unwelded 4% Mg and 5% Mg sheet to atmosphere and sea water. Stress-corrosion sensitivity. 12 ref. (R3, R4b, K9; Al, *Mg,* 4-53)

146-R. (German.) **Remarks on Corrosion of Steam Boiler Heater Surfaces.** Alberts Upmalis. *Svensk Papperstidning,* v. 60, Oct. 15, 1957, p. 699-705.

Protective methods based on research and experience are: absorption of sulphur trioxide, neutralization of sulphuric acid, use of resistant materials and proper management of the boiler. (R4d, R10, T26q)

147-R. (Swedish.) **Corrosion in Steam Boilers.** Torsten Widell. *Tekniska Foreningen i Finlands Forhandlingar.* v. 77, Sept. 1957, p. 209-218.

(*)Articles Available Through Photocopy Service; See Coupon, p. 63.

Corrosion due to composition of modern heavy oils and their deposits in the air-preheater. The formation of sulphuric acid and sulphur trioxide. Analysis of the corrosive action at low and high temperatures. Corrosion-preventing oil additives. 23 ref.
(R6g, R7e, R7k, B10b, T26q)

148-R.* Corrosion of Stainless Steels in Boiling Acids and Its Suppression by Ferric Salts. Michael A. Streicher. *Corrosion,* v. 14, Feb. 1958, p. 59t-70t.

Influence of various alloying elements in stainless steels on the course of corrosive attack by eight acids. Factors in the environment (acid concentration, corrosion products and oxygen) which determine the course of corrosion. The acids used were oxalic, formic, acetic, hydroxy-acetic, phosphoric, sulphuric, sulphamic and sodium bisulphate and the stainless steels included straight Cr (AISI 400 series), 18-8 Cr-Ni (AISI 300 series) and some Cr-Mn-Ni steels. 23 ref.
(R6g, R10a; SS)

149-R. Inter Society Corrosion Committee Glossary of Corrosion Terms. *Corrosion,* v. 14, Feb. 1958, p. 71t-72t.

Definitions for 53 commonly used terms. For certain terms, supplementary wording is included to make the definition more easily understood. (R general, 11-67)

150-R.* Corrosion of Metals in Tropical Environments. Pt. 1. B. W. Forgeson, C. R. Southwell, A. L. Alexander, H. W. Mundt and L. J. Thompson. *Corrosion,* v. 14, Feb. 1958, p. 73t-81t.

Corrosion rates and characteristics of 50 different metals and alloys exposed to five natural tropical environments for various periods. Corrosion rate of Al, Pb, Ni, Zn, Cu and structural steel. Corrosion data are obtained from weight loss and pitting measurements, visual inspection and physical property studies. 6 ref.
(R3s, 3-67; Al, Pb, Ni, Zn, Cu, ST)

151-R.* Effect of Inhibitors in Fuming Nitric Acid on Corrosion and Oxidation. Tin Boo Yee. *Corrosion,* v. 14, Feb. 1958, p. 82t-84t.

Procedure by which an inhibitor for fuming nitric acid can be selected to give good inhibition to corrosion and, at the same time, increase the oxidizing power of the acid. The inhibitors used in this study are KI, KIO_3, I_2, I_2O_5, CaF_2, HF, NH_4F, and Na_3AlF_6.
(R10b, R6g)

152-R. Corrosion of Lead Sheath in Manhole Water. *Corrosion,* v. 14, Feb. 1958, p. 85t-87t.

Tests were made in 45 selected manholes in Tokyo by attaching Pb coupons to cable sheaths in the manholes and submerging coupons in the manhole water. Corrosion losses by weight measured at 100 and 240 days were proportional to potential difference between cable and ground. Pitting was found where potential to ground was more than 100 mV. No relationship between weight losses and water composition could be determined because of varying potentials to ground. (R4a, R1j; Pb)

153-R.* Electrochemical Deterioration of Graphite and High-Silicon Iron Anodes in Sodium Chloride Electrolytes. S. Tudor, W. L. Miller, A. Ticker and H. S. Preiser. *Corrosion,* v. 14, Feb. 1958, p. 93t-99t.

Influences of specific resistivity of the electrolyte and of anodic current density on electrochemical deterioration. Deterioration of graphite increases with increasing specific resistivity or decreasing NaCl concentration of the electrolyte. The effect of impregnation of graphite anodes on the electrochemical deterioration rates and the variation of this effect with electrolyte specific resistivity are indicated. 9 ref. (R1a, W3h; Fe, *Si*, NM-k36)

154-R.* Corrosion in Amine Gas Treating Solutions. Frances S. Lang and J. F. Mason, Jr. *Corrosion,* v. 14, Feb. 1958, p. 105t-108t.

Laboratory corrosion tests on steel, stainless steels, Monel, and Ni in amine solution saturated with carbon dioxide and hydrogen sulphide. Effects of temperature, pressure and amine concentration and the presence of sludge. Type 304 and 316 stainless steel gave consistently low corrosion rates under all conditions. Monel was satisfactory when carbon dioxide or hydrogen sulphide were present singularly in the amine but mixtures of the gases were damaging. 9 ref.
(R7; ST, SS, Ni)

155-R.* Variables Influencing Corrosivity of Oil and Gas Wells. *Corrosion,* v. 14, Feb. 1958, p. 108-116, 120.

Well variables include temperature, pressure, carbon dioxide content, organic acid content, velocity. An example of poor correlation among these factors and accepted theories of well corrosion. Influence of steel inhomogeneities and problems involving human error.
(R general, T28; ST)

156-R. Rusting and Its Cost to Farming. E. E. White. *Corrosion Technology,* v. 4, Dec. 1957, p. 413-416.

(R general, T3)

157-R.* Corrosion Problems With Fuming Nitric Acid Rocket Fuel Requires New Tests. M. G. Fontana. *Corrosion Technology,* v. 4, Dec. 1957, p. 423-424.

Corrosion fatigue of materials in fuming nitric acid; cathodic protection tests and stress-corrosion tests of certain types of stainless steel; polarization studies of Al and stainless steel; studies designed to show concentration cell corrosion, including corrosion by sludged fuming nitric acid. (R6g, R11s; SS)

158-R. (French.) **Cathodic Protection of Pipes by Drawing Off Current.** G. Fauvel. *Corrosion et Anticorrosion,* v. 5, no. 11, p. 331-338.

The effectiveness of a cathodic protection system depends upon length of pipe to be protected and size of the ground terminal. An example of calculation of cost of protection by kilometer of pipe is given. The size of the ground terminal is calculated as a function of intensity of the protecting current and ground resistivity. The rectifiers used are chosen with respect to economic conditions and physical properties of the protected pipe. (R10d, 5-60)

159-R. (French.) **Thickness Decrease in Steel Sheets and Pipes Caused by Corrosion.** M. G. Piron. *Corrosion et Anticorrosion,* v. 5, Nov. 1957, p. 339-347.

Several nondestructive processes are reviewed, including photography, television, acoustic methods, radiography and electric methods. The magnetic method is emphasized.
(R11a, S14, 4-53, 4-60; ST)

160-R. (French.) **Protection of Materials for Propellant Rocket Motors Working With Unstable Combustion.** B. Langenecker. *Métaux, Corrosion, Industrie,* no. 385, Sept. 1957, p. 343-351.

Gaseous bubbles tear small crystals off the metal surface by condensation. The catalytic activity of the exposed surfaces is such that the flash point of the fuel is lowered and combustion accelerated. Then, metallic grains are burnt or melted. The only preventive is the increase of combustion stability. 24 ref. (R7d, T2p)

161-R. (German.) **Structure of Scale and Strength of Adhesion to the Surface of Carbon Steel Plates.** Hans-Jurgen Engell and Friedrich-Karl Peters. *Archiv für das Eisenhüttenwesen,* v. 28, Sept. 1957, p. 567-574.

Both the final hot rolling temperature and the killing of steel with Si or with Si and Al influence the formation and the strength of adhesion of scale. The structure and composition of scale was investigated and the formation of an intermediate layer of high silicate contents in killed steel was proven. 8 ref. (R2q, M28; CN, 4-53)

162-R. (German.) **Rust Inhibitors.** H. Spindler. *Fertigungstechnik,* v. 7, Sept. 1957, p. 429-430.

Determination of exact amount of the rust inhibitor required is main obstacle in application. Its usability must be determined in practice. 10 ref. (R10b; CI, ST)

163-R.* (Italian.) **On Some Inhibitors of Aluminum Corrosion. Pt. 2. Effect of Tannic Acid on 99% Al in 1 *N* Hydrochloric Acid.** G. de Angelis and V. Carunchio. *Metallurgia Italiana,* v. 49, Nov. 1957, p. 783-792.

On basis of loss of weight and reaction potential of Al electrodes in a galvanic cell, and of electrochemical behavior and polarization curves of an Al-Fe couple, it is concluded that dissolution of Al in 1 *N* HCL is electrochemical in nature and under mixed control; that tannic acid inhibits corrosion of 99% Al by acting on anodic and cathodic polarizations; that action of the acid is presumably due to its adsorption over entire surface (i.e., on both anodic and cathodic areas). 19 ref. (R10b; R6g; Al, Fe)

164-R.* (Russian.) **Corrosion Resistance of Metals Used in Hydroturbine Parts.** M. G. Timerbulatov. *Metallovedenie i Obrabotka Metallov,* Oct. 1957, p. 12-18.

Seven grades of steels and two grades of high-strength cast iron evaluated for weight losses due to corrosion in water. Addition of phosphorus to carbon steel containing 1.32% Cu was detrimental. High-strength cast iron was worse than carbon steel containing Cu. Negligible losses were observed with steel containing 12.33% Cr. Details of best heat treatment of carbon steel containing Cu in respect to best anticorrosive properties. 5 ref.
(R4, 2-60; ST, CI)

165-R. Corrosion in Nuclear Power Production. B. L. Harbourne. *Corrosion Prevention and Control,* v. 5, Jan. 1958, p. 43-48.

Factors influencing the selection of canning materials. Role of the coolant in the deterioration of the fuel element can has been considered for three reactor systems. 11 ref.
(R general, T11g)

166-R. Causes and Prevention of Corrosion in Tar Stills. D. McNeil. *Corrosion Technology,* v. 4, Nov. 1957, p. 385-389.

(R7c, R10; ST)

167-R. Corrosion Investigation by Electrical Measurements. D. Hendrickson. *Corrosion Technology,* v. 4, Nov. 1957, p. 390-393.

Application of soil surface potential method of survey to locating corroding areas and approximating current density of discharge for Mokelumne Aqueduct consisting of 81 miles of parallel bituminous coated and cement mortar coated pipes. (R8, 1-54; 4-60)

168-R. Corrosion Resistance of Cobalt. R. S. Young. *Corrosion Technology,* v. 4, Nov. 1957, p. 396-397, 403.

12 ref. (R general; Co)

169-R.* Investigations Into Stress-Corrosion Cracking in Welded Gas Plant. *Gas Journal,* v. 292, Nov. 27, 1957, p. 464-470.

Stress-relieving of welded components by Linde low-temperature process and control of liquor compositions are effective in preventing cracking. (R1d, J1a, 9-72)

170-R.* Corrosion Studies With Nickel-Chromium Plate. H. Brown, M. Weinberg and R. J. Clauss. *Plating,* v. 45, Feb. 1958, p. 144-150.

Best improvement in the outdoor corrosion resistance of Cr-plated fine-grained bright Ni deposits were obtained by operating the bright Cr plating bath at 131° F. and at ratios of chromic acid anhydride to sulphate of 150:1 to 200:1, and with the use of at least 0.03 mil of bright Cr plate, preferably 0.05 to 0.08 mil. 6 ref. (R3, L17b; *Ni, Cr*)

171-R.* Salt Spray Testing of Tin-plated Copper. Pt. 1. Corrosion Measurement by Chemical Porosity Test. Martin S. Frant. *Plating,* v. 45, Feb, 1958, p. 157-160.

Difference in porosity (or more precisely, copper surface available to the reagent) before and after exposure to salt-spray is used as a measure of corrosion. Correlation of visual results with the porosity test; use in determining corrosion rates, in comparing various types of salt spray, in determining effect of plating thickness on corrosion resistance, in comparing different plating solutions, and effect of reflowing (melting) the Sn coating. 13 ref. (R11j, L17c; Sn, 8-62)

172-R.* (German.) **Protective Action Anodized Layers on Aluminum and Methods for Testing.** W. Wiederholt. *Aluminium,* v. 34, Jan. 1958, p. 21-29.

Layer thicknesses can be determined microscopically, gravimetrically and by measurement of breakdown potentials and by special instruments; by determination of oxide layer density and effectiveness of sealing. Results of tests can be checked by corrosion tests. 9 ref. (R11, S14, 1-54; Al, 8-73)

173-R. (German.) **Resistance of Aluminum to Normal Organic Solvents.** K. Broockmann. *Aluminium,* v. 34, Jan. 1958, p. 30-35.

Addition of water and ketone can prevent corrosion by common organic solvents. 14 ref. (R7, R10d; Al)

174-R. (Russian.) **Formation of Scale on Steel Castings.** B. B. Gulyaev and Yu. F. Borovskii. *Liteinoe Proizvodstvo,* June 1957, p. 5-7.

Mechanism of scale formation. (R2q, 5-60; ST)

175-R. (Russian.) **Experiments With Gaseous Corrosion Under Stress.** M. Ya. Lvovskii and G. E. Moskalenko. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1374-1376.

Corrosion of sheet metal at high temperatures. (R1d, R6, 2-62, 4-53)

176-R. (Swedish.) **Investigation of Corrosion Risks in Clay.** Allan Bergfelt. *Statens Nemd for Byggnadsforskning, Transactions,* no. 28, 1957, 63 p.

Electrochemical processes involved in corrosion of metals in soil. Quantitative estimates of amount of corrosion. Formula for loss of weight as a function of the resistivity and electromotive force. Factors influencing corrosion of metals in soil. 26 ref. (R8; CI, ST)

Inspection and Control

83-S. Ultrasonic Inspection Makes Turbine Forgings Safer. Robert N. Hafemeister. *American Machinist,* v. 101, Dec. 30, 1957, p. 85-89.

(S13g, 4-51)

84-S. Determination of Tellurium in Lead and Lead Alloys. N. W. Fletcher and R. Wardle. *Analyst,* v. 82, Nov. 1957, p. 743-746.

5 ref. (S11f; Pb, *Te*)

85-S. Determination of Bismuth in Lead and Lead Alloys. N. W. Fletcher and R. Wardle. *Analyst,* v. 82, Nov. 1957, p. 747-750.

7 ref. (S11a; Pb, *Bi*)

86-S. Spectrochemical Determination of Lead in Steel. L. C. Flickinger, E. W. Polley and Frank A. Galletta. *Analytical Chemistry,* v. 29, Nov. 25, 1957, p. 1778-1779.

(S11k; ST, *Pb*)

87-S. Determination of Oxygen in Titanium and Titanium Alloys, Based on the Principle of Chlorination. W. T. Elwell and D. M. Peake. *Analyst,* v. 82, Nov. 1957, p. 734-742.

22 ref. (S11b; Ti, *O*)

88-S. Determination of Oxygen in Niobium. W. R. Hansen and M. W. Mallett. *Analytical Chemistry,* v. 29, Nov. 25, 1957, p. 1868-1869.

(S11r; Cb, *O*)

89-S. Determination of Uranium Dioxide in Stainless Steel. X-Ray Fluorescent Spectrographic Solution Technique. Louis Silverman, William W. Houk and Lavada Moudy. *Analytical Chemistry,* v. 29, Dec. 1957, p. 1762-1764.

6 ref. (S11p; SS, *U*)

90-S. Quality Control of Welded Steel Pipe. *Canadian Metalworking,* v. 20, Dec. 1957, p. 10-12.

(S13, F26p, 9-57; ST)

91-S. The Silver Reductor. Its Usefulness in the Assaying of Copper, Iron and Uranium. J. L. P. Wyndham. *Canadian Mining Manual,* 1957, p. 143-147.

Novel method of reducing Fe, Cu and U in certain solutions has wide application in any laboratory conducting assays in batch quantities. Method is particularly apt when poisonous effects of mercuric chloride are a problem, or where there is difficulty in procuring reagents. 4 ref. (S11s; Cu, Fe, U)

92-S. Eddy Currents That Tell the Thickness. Ants Piip. *Design Engineering,* v. 3, Dec. 1957, p. 50-54.

(S14h)

93-S. Strip Mill Control. *Iron and Steel,* v. 31, Jan. 1958, p. 8-10.

Nucleonic thickness gage automatically governs screw-down at D. F. Taylor and Co., Ltd. (S14e, F23; ST)

94-S. Mass Spectrometric Examination of Anode Gases From Aluminum Reduction Cells. Jack L. Henry and R. D. Holliday. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1384-1385.

Anode gas samples taken from commercial Al reduction cells of both pre-baked anode and continuous or Soderberg anode types. 8 ref. (S11r, C23; Al)

95-S. Method of Surface Analysis and Its Application to Reduced Nickel Powder. M. W. Roberts and K. W. Sykes. *Royal Society, Proceedings,* Series A, v. 242, Nov. 1957, p. 534-543.

Determination of nature of impure metal surfaces by comparing their adsorptive properties with those of the pure metal. 26 ref. (S11g; Ni, 6-68)

96-S. (French.) **Standardized Tolerances for Steel Work Pieces Produced on Horizontal Forging Machines.** Jean Jusson and Henri Liotard. *Metallurgie et la Construction Mecanique,* v. 89, Nov. 1957, p. 927-933.

Operation of forging machine and some of the shapes it can produce; dimensional variations of pieces obtained; announcement of publication of Standard NF 105 covering machining allowances. (S22, F22; ST)

97-S. (German.) **Determination of Boron Traces in Light Metal Alloys of High Silicon Content.** Christian Scharrnbeck. *Chemische Technik,* v. 9, July 1957, p. 416-418.

24 ref. (S11j; EG-a39, *Si, B*)

98-S.* (Russian.) **Analysis of Pure Metals.** V. A. Nazarenko. *Zavodskaya Laboratoriya,* v. 23, no. 10, 1957, p. 1162-1167.

Determination of micro-impurities in metals may be made with a sensitivity of 10^{-6}%. The following three methods are generally used: radioactivization, spectroscopy including flame photometry, and chemical analysis, which in its last stages may resort to colorimetry, or polarography. Application and accuracy of each of these methods. 44 ref. (S11)

99-S. (Russian.) **Radiochemical Methods of Analysis in the U.S.S.R.** I. P. Alimarin. *Zavodskaya Laboratoriya,* v. 23, no. 10, 1957, p. 1168-1171.

(S11q)

100-S. (Russian.) **Flaw Detection in Metals.** S. T. Nazarov. *Zavodskaya Laboratoriya,* v. 23, no. 10, 1957, p. 1230-1234.

(S13)

101-S. (German.) **Penetration Power of Radioactive Isotopes.** Hermann Möller and Helmut Weeber. *Archiv für das Eisenhüttenwesen,* v. 28, Sept. 1957, p. 543-546.

Penetrating tests were carried out on metal thicknesses from 15 to 160 mm. with In-192, Cs-137 and Co-60. From 15 to 60 mm. Indium proved to give best picture qualities. From 50 mm. upward, Co is most efficient since it warrants shorter exposive times than the other two isotopes. Cesium radiation is not superior. 8 ref. (S13e; *In, Cs, Co,* 14-63)

102-S. (German.) **Electrochemical Fundamentals of the Isolation of Steel Components.** Walter Koch and Heinz Sundermann. *Archiv für das Eisenhüttenwesen,* v. 28, Sept. 1957, p. 557-566.

The electrolytic analysis of steel by component can be performed

(*) Articles Available Through Photocopy Service; See Coupon, p. 63.

with a new apparatus, permitting the representation of current density in relation to the potential in diagrams. 11 ref. (S11g, 1-53; ST)

103-S. (German.) **Application of Mathematical Statistics to Problems in the Iron and Steel Industry.** Kurt Orths. *Stahl und Eisen,* v. 78, Jan. 9, 1958, p. 14-21.

30 ref. (S12; A4, ST)

104-S. (Russian.) **Precipitation to Obtain Concentrates of Cd, Pb, Bi and Zn During Analysis of Alloys.** A. K. Babko and P. V. Marchenko. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1278-1283.

Analysis of heat resistant alloys of Ni, Mo or W. Pyridine and a slow-acting precipitant thioacetamide were used to obtain the needed conditions for precipitation. 4 ref. (S11f; SGA-h, Mo, Ni, W)

105-S. (Russian.) **Analysis of Pure Metals.** V. A. Nazarenko and M. B. Shustova. *Zavodskaya Laboratoriya,* v. 23, 1957, p. 1283-1286.

Determination of Ta in Zr and Cb. (S11; *Ta,* Zr, Cb)

106-S. (Russian.) **Amperometric Titration of Indium Complex.** V. M. Vladirimova. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1286-1289.

4 ref. (S11j; In)

107-S. (Russian.) **Determining Copper and Zinc Content of Alloys by Amperometric Titration With Rotating Platinum Micro-Electrodes.** V. A. Khadeev and A. K. Zhdanov. *Zavodskaya Laboratoriya,* v. 23, 1957, p. 1290-1291.

(S11j; Cu, Zn)

108-S. (Russian.) **Determining the Carbide Content in Corrosion Resistant Steels by Electrolysis.** M. M. Shapiro. *Zavodskaya Laboratoriya,* v. 23, 1957, p. 1292-1294.

5 ref. (S11g; SS, *C*)

109-S. (Russian.) **Determination of Sulphur Content of Various Materials by Reduction With Para Zinc.** M. S. Kurchatov. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1294-1296.

8 ref. (S11; S, *Zn*)

110-S. (Russian.) **Complexometric Method of Determining Calcium and Magnesium in Iron Ore.** O. V. Datsenko. *Zavodskaya Laboratoriya,* v. 23, 1957, p. 1296-1298.

(S11g; RM-n, Fe, *Ca, Mg*)

111-S. (Russian.) **Contemporary Status of the Analytical Chemistry of Beryllium.** V. G. Goryushina. *Zavodskaya Laboratoriya,* v. 23, 1957, p. 1300-1307.

Review of literature. Analysis of minerals; separation of Be from other metals; volumetric determination of Be; colorimetric determination of Be. 86 ref. (S11, 10-54; Be)

112-S. (Russian.) **Spectroscopic Analysis of High-Purity Zinc by Vacuum Sublimation.** D. M. Shvarts and L. N. Kaporskii. *Zavodskaya Laboratoriya,* v. 23, 1957, p. 1309-1313.

15 ref. (S11k; Zn)

113-S. (Russian.) **Spectral Analysis of Titanium.** L. M. Filimonov, A. I. Essen and Z. A. Zakharova. *Zavodskaya Laboratoriya,* v. 23, 1957, p. 1313-1315.

13 ref. (S11k; Ti)

114-S. (Russian.) **Spectroscopic Analysis of Titanium-Base Alloys.** K. A. Moiseeva, K. A. Sukhenko, S. I. Mladentseva and A. V. Aksenova. *Zavodskaya Laboratoriya,* v. 23, 1957, p. 1316.

(S11k; Ti)

115-S. (Russian.) **Spectroscopic Analysis of Beryllium.** P. M. Polyakov, A. K. Rusanov and I. M. Blokh. *Zavodskaya Laboratoriya,* v. 23, 1957, p. 1320-1323.

4 ref. (S11k; Be)

116-S. (Russian.) **Spectrochemical Determination of Small Quantities of Uranium in Native State.** T. M. Moroshkina, V. K. Prokofev and M. N. Smirnova. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1324-1327.

4 ref. (S11k; U, RM-n)

117-S. (Russian.) **Spectroscopic Semi-Quantitative Determination of Boron in Ores and Minerals.** B. M. Maslennikov and L. V. Romanova. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1327-1328.

(S11k; *B,* RM-n)

118-S. (Russian.) **Experiments With Spectroscopic Apparatus "Fian" to Determine Phosphorus Content of Steels.** L. M. Ivantsov, I. I. Konstantinov, V. V. Sukhovalova and A. I. Shurygin. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1329-1332.

(S11k; ST, *P*)

119-S. (Russian.) **Spectrochemical Determination of Small Quantities of Columbium in Ores.** V. V. Nedder. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1336-1337.

4 ref. (S11k; Cb, RM-n)

120-S. (Russian.) **Spectroscopic Determination of Iron, Manganese, Magnesium, Silicon and Lead in Cupronickel MN-19.** G. M. Volkogon, G. D. Smirnovoi and V. I. Rogov. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1337-1338.

(S11k; Cu, Ni; *Fe, Mn, Mg, Si, Pb*)

121-S. (Russian.) **Use of Rated Graphs in Spectroscopic Analysis of High Speed Steels and Bronze AZH-9-4.** R. I. Kusheva and A. V. Kungrurova. *Zavodskaya Laboratoriya,* v. 23, no. 11, 1957, p. 1357-1360.

(S11k; TS-m, Cu-s)

122-S. Investigation and Controls of Openhearth Production Problems. A. V. Lang and T. A. Cleary, Jr. *Blast Furnace and Steel Plant,* v. 45, Dec. 1957, p. 1407-1412.

Application of statistical methods to investigation and control of basic openhearth production. Correlation analysis, long-term and short-term trends. 5 ref. (S12, D2)

123-S. Magnetic Particle Inspection of Gray Iron Castings. Arthur Lindgren. *Foundry,* v. 86, Feb. 1958, p. 178-184.

(S13j; CI-n)

124-S.* Thickness of Lead Deposits. Measurement by Means of Beta Rays. Gunner Gabrielson and Kurt Ljunggren. *Metal Finishing,* v. 56, Feb. 1958, p. 52-53.

Method of measuring thicknesses of metallic coatings by means of back-scattering of beta rays is more accurate the larger the difference between the atomic numbers of the coating and the basis metal. Since lead has a very high atomic number, the method is suitable for determining the thickness of a lead deposit on most common metals (e.g., Fe and Cu). (S14e; Fe, Cu, *Pb*)

125-S. Automatic Gauge Control of Cold Rolling. *Metal Treatment and Drop Forging,* v. 25, Jan. 1958, p. 29-30, 32.

Radio-isotope method controls strip thickness at D. F. Taylor and Co., Ltd., Birmingham, England. (S14e, 1-59, F23; ST, 4-53)

126-S. Brightness of Fluorescent Penetrants, Its Measurement and Influence in Detecting Defects. D. W. Parker and J. T. Schmidt. *Nondestructive Testing,* v. 15, Nov-Dec. 1957, p. 330-332, 354.

(S13k)

127-S. Ultrasonic Testing of Material for Nuclear Components. Frank W. Armstrong. *Nondestructive Testing,* v. 15, Nov-Dec. 1957, p. 342-344, 350.

(S13g, T11)

128-S. A Way to Speed Analysis. *Steel,* v. 141, Dec. 9, 1957, p. 156.

Steel foundry uses X-ray spectrometer to analyze heats in 1/10 the time formerly required. (S11p, E10; ST)

129-S. (French.) **Cause of Error in Wet Determination of Nitrogen in Special Steels.** René Castro, Jacques Allemand and René Poussardin. *Analytica Chimica Acta,* v. 17, Dec. 1957, p. 530-534.

Determination of N in normal or special steels by Kjeldahl method can give results that are too high if acid used contains impurities such as nitrates and if metal contains even a few ten-thousandths of molybdenum. 4 ref. (S11; ST, *N*)

130-S. (Russian.) **Ultrasonic Flaw Detection in Cast Iron.** N. V. Khimchenko. *Liteinoe Proizvodstvo,* Aug. 1957, p. 15-18.

Method was found to be sensitive to the presence of free graphite particles in cast iron. 3 ref. (S14g; CI)

T Metal Products and Parts

64.-T.* High-Temperature Loop for Circulating Liquid Metals. R. W. Fisher and G. R. Winders. Paper from "Liquid Metals Technology", Pt. 1. Chemical Engineering Progress Symposium Series, p. 1-6.

A tantalum loop enclosed in outer envelope of Inconel used in connection with electromagnetic pump and heating transformer to study flow rate, corrosion and mass transfer in circulation of an Mg-Th eutectic and a Bi-U alloy at temperatures of 800 to 950° C. and times up to 5000 hr.

(T11p, 17-57, R2a, R6m; Ta, Mg, Th, Bi, U)

65-T. Fiber Metal Commutator Brushes. Cord H. Sump, George A. Forster and Harlan G. Hamre. *Electrical Manufacturing,* v. 60, Dec. 1957, p. 128-129.

Molybdenum fiber brush on silverplated slip ring assembly overcomes electrical raise problems. Operation at speeds up to 30,000 fpm. shows no rapid wear or overheating.

(T1, H17, 17-57; Ag, Mo)

66-T. Powdered Metal Tool Bodies Boost Machining Efficiency. Horace Frommelt. *Iron Age,* v. 180, Nov. 14, 1957, p. 166-167.

Powdered metal tool bodies dampened vibration, increasing tool life in milling SAE 1020 and SAE 4340 steels. (T6n, G17b; ST, AY, 6-72)

62-T. Aluminium Aerosol Containers in Europe. *Light Metals,* v. 20, Nov. 1957, p. 359-362.

(T10g, 17-57; Al)

68-T. Light Alloys and Road Transport—a Critical Commentary. *Light Metals,* v. 20, Nov. 1957, p. 366-367.

(T21d, T21e, 17-57; Al, Mg)

69-T. Aluminium in Public Lighting. *Light Metals,* v. 20, Dec. 1957, p. 397-403.

Aluminum is replacing other materials in street-lighting equipment in many countries. (T26a, 17-57; Al)

70-T. Making the Massey-Harris Ferguson-35 Tractor. *Machinery,* v.

91, Dec. 13, 1957, p. 1360-1372. (T3n)

71-T. French Developments in Sintered Ceramic Cutting Tools. Leon Gion and Louis Perrin. *Machinery,* v. 91, Dec. 20, 1957, p. 1420-1430.

Manufacture of sintered oxide ceramics and tests on the application and behavior of the material when used for cutting tool tips. Tests included the machining of various grades of steel and cast iron, and gave information on effects of various rates of feed, surface speed and depth of cut. (T6n, G17, 17-57; 6-70)

72-T.* Porous Metal Filter Media Solve Tough Operating Problems. Jules Kovacs. *Materials in Design Engineering,* v. 47, Jan. 1958, p. 126-128.

Filter units are made by sintering metal powders of controlled particle size to obtain the desired porosity and pore size. Metals are selected to meet specific service requirements and include all grades of stainless steel, nickel, Monel, Inconel, Hastelloy, Durimet 20, bronze, NiAg, Au and Ag. (T7, 17-57, H15, 6-71)

73-T. Forum on Enamelling in Architecture. E. Mackasek and T. J. MacArthur. *Metal Finishing Journal,* v. 3, Oct. 1957, p. 413-417.

Vitreous enamel, steel and aluminum panels for curtain walls and other architectural purposes. Problems encountered. (T26n, L27; Al, ST)

74-T. Kaiser Aluminum Deep Drawn Cans for Food Industry. *Modern Industrial Press,* v. 19, Dec. 1957.

(T10g, 17-57, G4b; Al)

75-T. Testing Titanium Afloat. *Modern Metals,* v. 13, Jan. 1958, p. 32-40.

Nine types of Ti boat fittings weighing 312 lb. give 43.5% weight saving in luxury cruiser. Aim of Mallory-Sharon test program is to prove Ti's value in rigorous seagoing use. (T22, 17-57; Ti)

76-T. Aluminum: New Process. Latest Can-Making Techniques Seen as Means of Increasing Marketing Potential for Aluminum. *Packaging Parade,* v. 25, Dec. 1957, p. 68-72.

(T10g, 17-57; Al)

77-T. Platinum-Cored Thermionic Valves in the Transatlantic Telephone Cable. G. H. Metson. *Platinum Metals Review,* v. 2, Jan. 1958, p. 2-6.

British repeater remarkable for high-slope tubes with platinum cored cathode, which increase traffic handling capacity. (T1b, 17-57; Pt)

78-T.* Development of High-Tensile Aluminium-Bronze Alloys for Marine Propellers in Great Britain and the United States of America. F. Hudson. *Shipbuilder and Marine Engine Builder,* v. 64, Dec. 1957, p. 681-687.

Advantages of high-tensile Al-bronze for propeller source; founding of marine propellers, including melting and molding practice. (T22h, 17-57, E10; Cu-s, *Al*)

79-T. Tool Steels. Steels for Plastic Molding Applications . Pt. 6. L. F. Spencer. *Steel Processing and Conversion,* v. 43, Oct. 1957, p. 570-575.

Chemical composition, carburizing and tempering treatments, mechanical properties, corrosion resistance of typical toolsteels used for cavity molds or hobbs for plastic molding application. Consideration in selecting steel. 4 ref. (T29s, 17-57; TS)

80-T. Some Producibility Aspects of Advanced Aircraft Structures. Alfred H. Peterson. *Western Machinery and Steel World,* v. 48, Dec. 1957, p. 90-93.

Introduction of higher strength alloys needed for future aircraft, machining and weight problems. (T24, G17; SGA-h, SGB-a)

81-T. (French.) **Use of Nickel and Nonferrous Nickel Alloys in Naval Construction.** L. Arbellot. *Revue du Nickel,* v. 23, Sept. 1957, p. 73-85.

Mechanical properties and resistance to corrosion of Ni, Monel and Cu-Ni alloys. (T22, Q general, R general, 17-57; Ni)

82-T. (German.) **Aluminum as a Printing Surface.** R. Brammer. *Aluminium,* v. 33, Dec. 1957, p. 794-797.

(T9n, 17-57; Al)

83-T. (German.) **Aluminum Alloys as Electrode Material.** H. Grefkes. *Aluminium,* v. 33, Dec. 1957, p. 802-803.

Extruded electrodes of Al-Mg-Si alloys behave well in upsetting time, life and cost. 7 ref. (T1f, F22j; Al, 17-57)

84-T. Production of Integrally-Stiffened Panels for the Vanguard Airliner. *Machinery (London),* v. 91, Nov. 15, 1957, p. 1124-1136.

Operations at Vickers-Armstrong. (T24a, G general)

85-T. Construction of the Airframe for a Guided Anti-Aircraft Missile. F. B. Stencel. *Machinery (London),* v. 91, Nov. 15, 1957, p. 1137-1140. (From *Aluminium Suisse.*)

(T24e)

86-T. (French.) **Electricite de France's Information Center at Avignon.** André Chevrier. *Revue de l'Aluminium,* v. 34, Dec. 1957, p. 1220-1223.

Decorative and structural Al extensively used in modernized building. (T26n, 17-57; Al)

87-T. (Russian.) **Development of Toolsteel.** Y. A. Geller. *Metallovedenie i Obrabotka Metallov,* Nov. 1957, p. 43-56.

Compares effectiveness of carbon steel, high-Cr steel and high-speed steel in tool performance. (T6n, 17-57; TS)

88-T. Evaluating Ceramic Tools. Pt. 1. D. R. Kibbey and W. T. Morris. *Automatic Machining,* v. 19, Jan. 1958, p. 36-38.

Analysis of variables and multi-variable testing method used to determine how various variables affect cutting tool performance. (To be continued.) (T6n, 17-52; 6-70)

89-T.* Ceramic Cutting Tools—a Progress Report. George W. Barnes. *Grits and Grinds,* v. 48, no. 11, p. 3-8.

New La 687 tool material now being field tested shows much promise; appears to be 6 to 8 times better than its predecessor in wear resistance and tool life. (T6n, Q9n, 17-57; 6-70)

90-T. French Development in Sintered Ceramic Cutting Tools. Leon Gion and Louis Perrin. *Machinery,* v. 91, Dec. 20, 1957, p. 1420-1430.

Manufacture of sintered oxide ceramics and tests on the application and behavior of the material when used for cutting tool tips. Tests included the machining of various grades of steel and cast iron, and gave information on effects of various rates of feed, surface speed and depth of cut. (T6n, G17, H10, 6-70)

91-T. Milling Cutters Standardized for Light Metal. *Modern Metals,* v. 13, Nov. 1957, p. 56-58.

Standardized milling cutters designed especially for Al and Mg. (T6n, W25r; Al, Mg)

92-T. What Will Be the Future of Investment Castings in Aircraft and Missiles? A. H. Langenheim. *Precision Metal Molding,* v. 16, Jan. 1958, p. 44-45.

(T24, 17-57; 5-62)

93-T. Application of Precoated Steel Sheets in Industry. F. H. Smith. *Sheet Metal Industries,* v. 34, Dec. 1957, p. 915-923, 928.

Advantages of using electro-zinc precoated sheet steel illustrated for a wide variety of pressed cold formed and assembled parts. (T general, L17, 4-53; ST, *Zn*)

94-T. Automatic Production of Tapered Roller Bearings. *Sheet Metal Industries,* v. 34, Dec. 1957, p. 924-928.

(T7d, 17-57, 18-74)

95-T. Choosing Valve Materials. Joseph R. Driear. *Steel,* v. 141, Dec. 9, 1957, p. 161-162.

(T7b, 17-57; ST)

96-T. Fabricating the Redstone Missile. *Steel,* v. 142, Jan. 20, 1958, p. 66-71.

(T24e, G general, 17-57; Al)

97-T. These Bearings Don't Wear Out. *Steel,* v. 142, Jan. 20, 1958, p. 82-83.

Aluminum-on-steel bearings have an increased fatigue resistance and compressive strength. (T7d, Q28g, Q7a, Q9n, Al, *ST*)

98-T. Recent Progress in Cutting Tool Materials. William E. Montgomery. *Tooling and Production,* v. 23, Feb. 1958, p. 88-92.

Conventional tungsten carbides and new harder carbides such as WF, having a titanium carbide base with Mo as an alloy carbide addition and using Ni as a binder. (T6n, 17-57, 6-69)

99-T.* Materials and Welding for Nuclear Power Fuel Elements. L. M. Wyatt and F. S. Dickinson. *Welding and Metal Fabrication,* v. 25, Oct. 1957, p. 378-385, 396.

Forms of fuel elements and importance of welding in their manufacture. Tensile properties of canning materials, possible reactions between coolant and uranium, between coolant and can, and proper conditions and procedure for brazing and arc welding Mo, Ta, Zr, V, W, Mg, Al and stainless steels. (T11g, K1, K8, Q general, 17-57; Al, Be, Mg, Mo, Ta, Zr, SS)

100-T. Fabricating Earth Satellites. *Welding and Metal Fabrication,* v. 25, Nov. 1957, p. 443.

(T24f)

101-T. (German.) **Recent Experiments Concerning the Production of Gears.** H. Rettig. *Das Industrieblatt,* v. 57, Aug. 1957, p. 338-393.

Experiments with noncutting techniques in shaping of gears (and heavy-duty transmissions). Results with hot pressing, cold rolling, punching (gear wheels of sheet metal or heavy plate) and sintering of spur gears. (T7a, G11, G2j, H general)

102-T. (Russian.) **Cast Crankshafts for Automobile Engines.** D. P. Glukhov. *Liteinoe Proizvodstvo,* July 1957, p. 6-7.

Composition, microstructure and application of cast iron in production of crankshafts. (T21b, 7-57; CI)

103-T. (Pamphlet.) **Thermal Resistance of Airspaces and Fibrous Insulations Bounded by Reflective Surfaces.** H. E. Robinson, L. A. Cosgrove and F. J. Powell. Report 151, Nov. 14, 1957, 22 p. U. S. Government Printing Office, Washington 25, D. C. 20c.

(*)Articles Available Through Photocopy Service; See Coupon, p. 63.

Report on investigation at National Bureau of Standards on insulating values of panels insulated with Al foil membrane and Al foil in combination with fibrous insulations. (T26n, 17-57, 4-56; Al)

W Plant Equipment

77-W. Induction Hardening Utilizing Frequencies of 2 to 10 Kc/s. Hermann Kuhlbars. *AEG Progress,* v. 3, 1957, p. 99-105.

Factors influencing selection of medium-frequency equipment; machines for static and progressive hardening, with operational details; components and lay-out of a crankshaft hardening plant.
(W27k, J2g, T21c, 18-69)

78-W. Induction Heating for Hot Forming. Friedrich Scheffler. *AEG Progress,* v. 3, 1957, p. 109-114.

Thermal, mechanical and economic requirements of modern forging; appliances for induction heating.
(W27k, F22)

79-W.* Induction Furnaces. Hans Harbauer. *AEG Progress,* v. 3, 1957, p. 114-123.

Principle of induction furnace; description, operation, application, electrical connection, advantages and disadvantages of channel and coreless furnace. (W27k)

80-W.* Electrical Equipment of Arc Furnaces in the Iron and Steel Industry. Albert Driller. *AEG Progress,* v. 3, 1957, p. 125-138.

Construction, electrical equipment and electrode control systems of 150-ton DEMAG arc furnace. New systems of high-speed automatic electrode control give more uniform energy consumption and greater economy. (W18s, X10, 1-53)

81-W. Electronic Control in Resistance Welding. Albert Gericke. *AEG Progress,* v. 3, 1957, p. 143-148.

(W29c, K3)

82-W. Spark Plus Hardens Steel in Russia. I. I. Kichkin. *American Machinist,* v. 10, Dec. 2, 1957, p. 97-99. (From *Vestnik Mashinostroeniia,* v. 36, May 1956, p. 65-68.)

Previously abstracted from original. See item 190-J, 1956.
(W28, L24, J28; ST, *Mg, Cr*)

83-W. Large Oven Furnace Program—Controlled for Versatile Heat Treating. Jere N. Helfat. *Industrial Heating,* v. 24, Dec. 1957, p. 2512-2516.

(W27, J2g, 18-74)

84-W. Modern Controls for the Iron and Steel Industry. Pt. 1. *Industrial Heating,* v. 24, Dec. 1957, p. 2521-2526.

Abstracts on automatic valves, openhearth, telemetering and remote control, from papers presented at Seventh Conference on Instrumentation. (W18r, X10, X12)

85-W. New Methods in Maintenance of Refractories in Steel Plants. Pt. 2. *Industrial Heating,* v. 24, Dec. 1957, p. 2573-2576.

Improved methods of roof patching of openhearth furnaces. (To be continued.) (W18r, D2, 18-71; RM-h)

86-W. Dust Control. *Iron and Steel,* v. 30, Oct. 9, 1957, p. 536-567.

Variety of processes and equipment in iron and steel industry create fumes and dust. Size and other properties of dust; operation, comparative efficiency and costs of common types of dust and fume control equipment including gravitational, inertial and centrifugal separators, washers, electrostatic precipitators and filtration units. Lists and describes British dust and smoke control plants. (W13c, A8a, 1-52; ST)

87-W. Electrical Equipment for a Modern Rod Mill. E. L. Anderson. *Iron and Steel Engineer,* v. 35, Jan. 1958, p. 112-126.

Electrical control equipment and drives at Bethlehem Steel Co., Johnstown, Pa.
(W23n, W23d, 1-52; ST)

88-W. Asarco's New Electrolytic Plant at Corpus Christi, Tex. A. C. Jephson and R. E. Allen. *Journal of Metals,* v. 9, *AIME Transactions,* v. 209, Oct. 1957, p. 1381-1384.

Zinc plant for treatment of densified fume with capacity of 80 to 90 tons of high-grade Zn daily. Operation including storage and grinding of fume, leaching, purification, electrolyzing and casting.
(W18e, 1-52, C19, C23; Zn)

89-W. Stretching the Wings of a DC-8. O. L. Rumble. *Machinery,* v. 64, Jan. 1958, p. 121-124.

A 600-ton press used to contour dihedral brake area of jet-liner wing skins. (W24g, G9, T24a; Al)

90-W. Production Speeded by Cold Extrusion. Karl Sieber. *Metalworking Production,* v. 101, no. 50, Dec. 13, 1957, p. 2215-2219.

German multi-stage press equipped with carbide dies used in cold extrusion of machine parts.
(W24g, W24n, 1-52, G5)

91-W. What to Look for in Aging Oven Design. Carl Mayer. *Modern Metals,* v. 13, Jan. 1958, p. 56-57.

Importance of temperature uniformity throughout the oven; design factors making for optimum efficiency. (W27, 1-52, J27d; Al)

92-W. Versatile Automatic Large Oven Furnace. Jere N. Helfat. *Steel Processing and Conversion,* v. 43, Oct. 1957, p. 581-589.

Gas-fired oven furnace with inside dimensions of 6 ft. cubed cam-actuated program control used for stress-relieving, annealing or normalizing. (W27g, 1-52, J23, J24, J1)

93-W. Single Shift Produces 32 Different Products, 10,000 Aluminum Castings. James Joseph. *Western Machinery and Steel World,* v. 48, Dec. 1957, p. 84-86.

Production is maximized by use of overhead conveyor which insures inspection within 6 min. after casting, reducing high losses of scrap.
(W12r, E general, 18-67, 18-74; Al)

94-W. (French.) **Steels for Molds Under Pressure.** M. K. I. Bengtsson. *Fonderie,* v. 140, Sept. 1957, p. 400-410.

Ingot molds undergo very severe stresses which depend on gradients of temperature and on Young's modulus and on Poisson's ratio of the steel. Influence of C, Si, Mn, Cr, Ni, Mo, W, V, Co and Ti. Thermal conductivity is decreased by the addition of any element except Co. Resistance to intergranular corrosion and mechanical properties of seven steels. Importance of heat treatment. Special surface treatments with nitrogen and sulphur give better resistance to temperature gradients.
(W19c, 17-57, 2-60, Q general, R general; AY)

95-W.* (French.) **Heat Treating Small Parts: the Shock Furnace.** *Metallurgie et la Construction Mécanique,* v. 89, Nov. 1957, p. 959-963.

Principle and operation of shock furnaces. (W27j)

96-W. (German.) **Induction Melting Furnaces.** Walter Annen. *Berg-und-Hüttenmännische Monatshefte,* v. 102, July-Aug. 1957, p. 189-197.

Principles and properties of induction heating with special regard to crucible furnaces using low and medium frequences.
(W18a, W18c, 1-52)

97-W. (German.) **Production of Iron and Steel.** Georg Bulle. *VDI Zeitschrift,* v. 99, Oct. 21, 1957, p. 1541-1546.

Practical advice on the construction of new mills. 51 ref.
(W17, W18, W23, 1-52; ST)

98-W. (German.) **Residual Stresses in Hot Rolling Rolls After Heavy Service.** Hans Bühler. *Stahl und Eisen,* v. 77, Nov. 28, 1957, p. 1740-1747.
14 ref. (W23k, F23, Q25)

99-W. (Italian.) **Standards for Rational Dimensioning of Compressed Air Equipment in Foundries.** Pier Giacomo Lanino. *Fonderia,* v. 6, Nov. 1957, p. 481-484.

(W19m, 18-67)

100-W. (Japanese.) **Iron Crucible Linings for Aluminum Melting.** Hiroshi Oikawa, Keizo Nishida and Shigeyasu Koda. *Light Metals (Tokyo),* v. 7, Nov. 1957, p. 40-47.

In a study of lining materials, alumina mixed with 2% sodium bicarbonate was found best. 6 ref.
(W18c, E10a; RM-h, Al)

101-W. (Russian.) **Power Plant Installations in the Iron and Steel Industry.** E. A. Dzhaparidze. *Stal',* v. 17, Nov. 1957, p. 1017-1023.

(W11, 1-52; ST)

102-W. (French.) **Copper Wire Rod Mill at the Le Havre Plant of Societe des Trefileries et Laminoirs du Havre.** *Cuivre, Laitons, Alliages,* no. 40, Nov-Dec. 1957, p. 13-18.

Renovated, largely automatic Garrett mill turns out 200 tons high-quality rod in 8-hr. shift with 43 workers. (W23d, 1-52; Cu)

103-W.* (French.) **A Half Million Motors Representing 1,500,000 Hp. Have Been Manufactured by Novacem.** Maurice Victor. *Revue de l'Aluminium,* v. 34, Dec. 1957, p. 1201-1205.

Novacem Co. makes extensive use of Al and die-cast Alpax in Lyons plant for essential parts of asynchronous motors from ½ to 8 hp.
(W11-5, 17-57; Al, 5-61)

104-W. (German.) **Machining of Aluminum Rolling Ingots With a New High Performance Milling Machine.** A. Roth. *Aluminium,* v. 33, Dec. 1957, p. 789-793.

Design and operation of the new machine for handling larger ingots. 10 ref. (W25r, W23g; Al, 5-59)

105-W. (German.) **Modern Wire Rolling Mills.** O. Wilmes. *Draht,* v. 8, Oct. 1957, p. 425-428.

Wire rolling mills with vertical rolls and independently operated stands; power input and distribution in a mill. (W24k, 1-2)

106-W. (German.) **Continuous Pusher-Type Heating Furnace With Full-Automatic Control in a Mill Rolling Special Steel Ingots.** Josef Heimerl. *Stahl und Eisen,* v. 77, Dec. 26, 1957, p. 1873-1877.

3 ref. (W20h, 1-61; ST, 5-59)

107-W. (Polish.) **Driving and Control of Reversed Rolling Mills for Cold Rolling of Strips.** W. Grzybowski. *Hutnik,* v. 24, Sept. 1957, p. 363-369.

Design of driving and controlling device of the rolling mill insuring even thickness of the strip. 7 ref.
(W23n, 17-51, W23f, 4-53)

108-W. (Russian.) **Equalizing Valves of Blast Furnaces.** D. A. Storozhik. *Stal',* v. 17, Oct. 1957, p. 874-883.

Design of an equalizing valve of the coupled type with a built-in electrodrive. (W17g, 17-51)

109-W. (Russian.) **Design Deficiencies of DSV-Type Arc Furnaces.** M. G. Dmitrienko and A. I. Sapko. *Stal',* v. 17, Oct. 1957, p. 902-904.

(W18s, 17-51)

110-W. (Russian.) **Wear of Rolls in Continuous Sheet Mills.** E. M. Palamarchuk. *Stal',* v. 17, Oct. 1957, p. 929-933.

Roll wear in continuous mills for hot rolling sheet. Both working and supporting rolls have to be inspected equally carefully to insure high-quality production. 4 ref. (W23k, Q9, 4-53)

111-W. Cupola With Continuous-Slit Tuyeres. A. A. Anan'in and B. P. Chernobrovkin. *Foundry Trade Journal,* v. 104, Jan. 30, 1958, p. 129. (Abridged translation from *Liteinoe Proizvodstvo.)*

Intensity of combustion occurring in a cupola is governed by the amount and quality of the fuel and on the quantity, temperature and composition of the blast. A new tuyere system has been developed in which the blast is introduced through peripheral slits. Construction employed and the results obtained. (W18d, E10a)

112-W. Baking Ovens for Paint Finishing Systems. Allen S. Dawe and John A. Kinn. *Industrial Heating,* v. 25, Jan. 1958, p. 127-139.

(W4k, L26)

113-W. Powder Metal Press Gets Uniform Density in Odd Shapes. *Iron Age,* v. 180, Dec. 26, 1957, p. 56-57.

(W26d, 1-52, J14)

114-W. Advanced Methods for Production of Direct-Current Motors and Generators. G. W. Ambro. *Machinery,* v. 91, Nov. 29, 1957, p. 1269-1275.

Equipment and methods in semi-automated machining, drilling, welding, milling, hardening and grinding. (W11q, G general)

115-W. Titanium-Tipped Anodizing Racks. *Metal Finishing,* v. 56, Feb. 1958, p. 65.

Tips determine life of the rack. Where once racks could only be used for a week to 10 days, the Ti tips have stretched the rack cycle to over three months. Some racks have lasted eight months without repairs. Comparative costs. (W3g, 17-57, L19; Ti)

116-W. New Mill Will Roll Tough Steels. *Steel,* v. 141, Dec. 2, 1957, p. 99-100.

A 32-in. cogging mill with grooved rolls used for rolling superalloys and high-speed steel ingots. (W23a; SS, SGA-h, TS-m)

117-W. Vacuum Crane Speeds Mill Output. *Steel,* v. 141, Dec. 2, 1957, p. 102, 105.

(W12q, 1-73; SS)

118-W. Loader Speeds Plating Line. *Steel,* v. 141, Dec. 2, 1957, p. 108.

Automatic handling of plating racks. (W12r, L17, 18-74)

119-W. How to Get More From a Spheroidizing Furnace. W. B. Leyda and Walter J. Assel. *Steel,* v. 141, Dec. 9, 1957, p. 208-210.

Controlled atmosphere, five-temperature-zone roller-hearth furnace anneals seamless alloy steel tubing. (W27n, J23r, 4-60; AY)

120-W. Spotwelder Speeds Assembly. *Steel,* v. 141, Dec. 16, 1957, p. 108.

Portable torch spot welder. (W29d, K3n)

121-W. Ductile Iron Moves In. *Steel,* v. 141, Dec. 16, 1957, p. 110-114.

Use of ductile iron in sintering plants, coke ovens, quenching cars, blast furnaces, openhearths and rolling mill. (W15, W16a, W18, W23, 17-57; CI-s)

122-W. Compacts Have Even Density. *Steel,* v. 141, Dec. 16, 1957, p. 116-119.

A 300-ton hydraulic compacting press achieves uniform density throughout powder metal part by proportional pressing. (W26d, H14g)

123-W. Continuous Annealing on a Grand Scale. C. E. Peck. *Steel,* v. 142, Jan. 20, 1958, p. 74-76.

Four-sectioned furnace anneals 60 tons of tin plate per hr. (W27, J23n, 1-61; ST, *Sn,* 4-53)

124-W. Transfer Pressing. Gordon M. Sommer and Robert H. Barlow. *Welding and Metal Fabrication,* v. 25, Oct. 1957, p. 386-391.

Transfer presses, their design, operations and benefits. (W24g)

125-W. (French.) **The Unit Die System.** Gustave Nyselius. *Fonderie,* no. 142, Nov. 1957, p. 516-517.

Advantages of system; preparation of unit dies, method of use. (W19n, 1-52)

126-W. (Russian.) **Induction Crucible Furnaces of Industrial Frequency for Light Alloy Melting.** V. A. Yakovlev. *Liteinoe Proizvodstvo,* June 1957, p. 8-15.

Design of crucible suitable for melting Mg alloys. Details of melting process in high-frequency induction crucible. Computation of power required. Results of experimental melting. 6 ref. (W18a, E10p; Mg)

127-W. (Russian.) **Design of a Contemporary Forging and Stamping Factory.** A. D. Bogdan. *Vestnik Mashinostroeniya,* v. 37, Oct. 1957, p. 39-49.

(W10, F22, G3, 18-67)

X Instrumentation

Laboratory and Control Equipment

17-X.* Sampling and Analysis for Impurities in Liquid Sodium Systems. J. R. Humphreys, Jr. Paper from "Liquid Metals Technology", Pt. 1, Chemical Engineering Progress Symposium Series, p. 7-10.

Vacuum distillation apparatus and technique devised for sampling liquid sodium in reactor coolant systems and analyzing for oxides and metallic impurities. Equipment can be modified and used for Hg, Cs, Rb, K, Cd, Zn, Mg or Li. 13 ref. (X21m, 1-73, S11; 14-60)

18-X.* Production of Close-Tolerance Brass Strip. *Sheet Metal Industries,* v. 35, Jan. 1958, p. 55-59.

Baldwin Instrument Co. automatic nucleonic thickness gage control equipment installed on the Robertson four-high mill at the Birmingham Works of D. F. Tayler and Co., Ltd. (X20c, W23c, 1-52; Cu-n)

19-X. (German.) **First Experience With the Use of Electronic Balances in an Iron Foundry.** Helmut Knüppel, Gert Wiethoff and Wolfgang Dorr. *Stahl und Eisen,* v. 77, Nov. 28, 1957, p. 1752-1759.

(X20h, W19, 1-53)

20-X. (German.) **Machines and Equipment for Testing Metallic Materials.** Hermann Mintrop. *VDI Zeitschrift,* v. 99, Sept. 21, 1957, p. 1348-1349.

17 ref. (X general, 1-52)

21-X. (German.) **Progress in the Area of Technical Temperature Measurement.** H. Lindorf. *Draht,* v. 18, Oct. 1957, p. 435-437.

Pyrometers of various construction and for various applications. 10 ref. (X9r)

22-X. Gage of Strip Measured by Electro-Mechanical Device. *Blast Furnace and Steel Plant,* v. 45, Dec. 1957, p. 1413-1414.

Electro-mechanical device translates dial positions from X-ray gage measuring thickness of steel strip into thousandths of an inch. (X20c, S14e, F23; ST, 4-53)

23-X. Non-Contact Automatic Gauge Control. *British Steelmaker,* v. 24, Jan. 1958, p. 18-21.

Nucleonic thickness gage operates cold strip mill to give closer tolerances. (X20c, W23c, 1-61, 18-74, S14e; Cu, ST)

24-X. Industrial Nucleonic Gaging. J. E. Reider. *Nondestructive Testing,* v. 15, Nov-Dec. 1957, p. 360-365.

(X20c, S14e)

25-X. (Russian.) **Automation of Charging and Control of Charge Level in Cupola Using Radioactive Isotopes.** G. K. Miroshnichenko, A. G. Vasilev, V. I. Shcherbakov and D. A. Lure. *Liteinoe Proizvodstvo,* Aug. 1957, p. 14-15. 3 ref.

(X13f, W18d, 1-59, 18-74)

(*)Articles Available Through Photocopy Service; See Coupon, p. 63.

EMPLOYMENT SERVICE BUREAU

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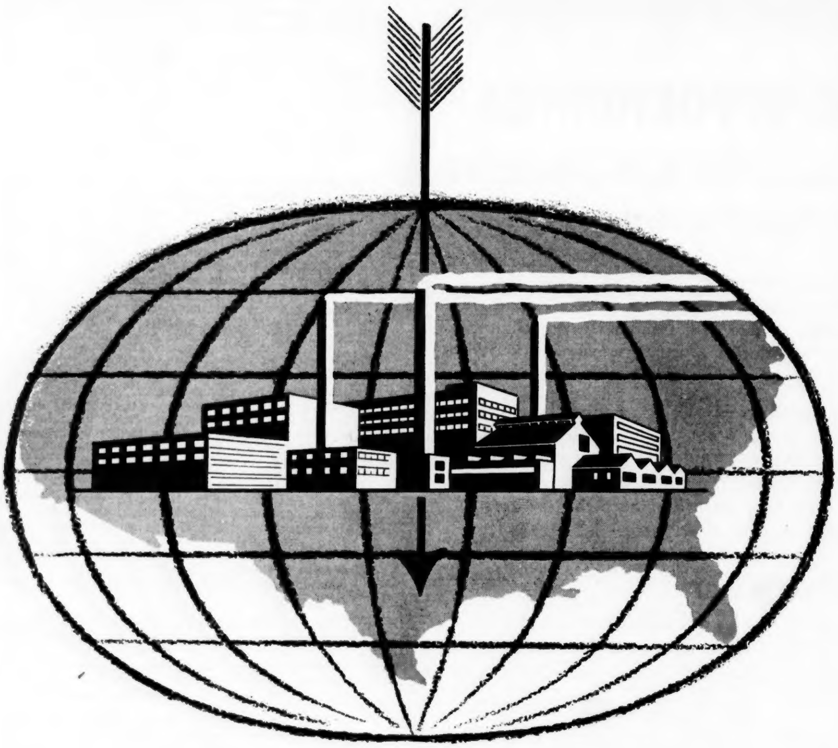
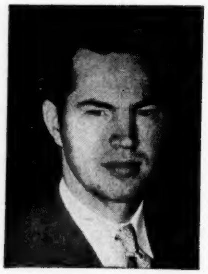
(Continued on p. 63)





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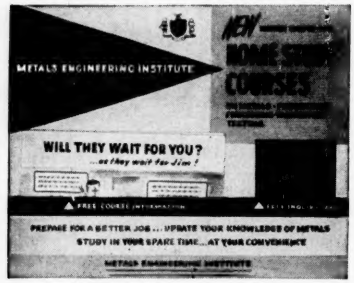

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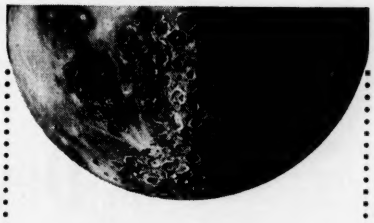

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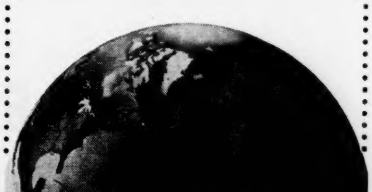

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(Continued from p. 57)

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